Initial Program Requirements for

NextGen Network Enabled Weather (NNEW)

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NNEW Initial Program Requirements

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TABLE OF CONTENTS

TABLE OF FIGURES

TABLE OF TABLES

1 BACKGROUND

This Initial Program Requirements document provides the requirements to be satisfied by the Next Generation Air Transportation System (NextGen)[1] Network Enabled Weather (NNEW) Program and System, a part of the NextGen Reduce Weather Impact (RWI) solution set.

1.1 The NNEW Program

The NNEW Program will develop the NNEW System to enable National Airspace System (NAS) stakeholders to access weather data produced by systems within the Federal Aviation Administration (FAA). In addition, the NNEW System will provide seamless interagency access to the National Oceanic and Atmospheric Administration's (NOAA) 4-Dimensional Weather Data Cube (4-D Wx Data Cube). Together, the combination of the NNEW System and the 4-D Wx Data Cube will provide common, universal access to aviation weather data. This will ensure that all categories of aviation weather users will have improved access to timely and accurate weather information to support improved decision making which will facilitate enhanced aviation safety. The objectives of the NNEW System are outlined as follows:

- Deliver network-enabled weather information services[2]
- Disseminate weather information to transportation decision makers and NAS users
- Provide access to the NOAA's "common weather picture" (4-Dimensional Weather Single Authoritative Source (4-D Wx SAS)); the complete, fully-sourced SAS will be delivered in by 2019
- Provide service adaptors[3] to legacy NAS systems in order to make the transition to the NNEW System transparent to them
- Provide user-specified sub-setting of weather information by:
    - Geospatial filtering/extraction

[1] Acronyms are defined in Appendix 2.

[2] Access to network enabled weather dissemination via discovery with access control.

[3] Service adaptor is a commonly used SOA term that refers to a software component that translates formats and communication protocols between a legacy system and a SOA system (such as the NNEW System).

- Temporal filtering/extraction
- Parameter based filtering/extraction
- Parameter Threshold based filtering/extraction
- Weather Product Resolution

1.2 The NNEW System and NOAA's 4-D Weather Data Cube

The concept of an interagency, multi-enterprise weather dissemination capability is a key element of the NextGen vision and is discussed in the NextGen Weather Concept of Operations.[4] The JPDO Weather Policy Study Team[5] describes the capability[6] as a shared, 4-dimensional (three spatial dimensions and one temporal) database of weather information viewed as a conceptually unified source distributed among multiple, physical locations and suppliers. In order to achieve the development of this capability, NOAA and the FAA will collaborate to deliver two autonomous systems, the 4-D Wx Data Cube and the NNEW System respectively, to seamlessly disseminate aviation weather information to aviation weather stakeholders.

Another key element of the NextGen vision is the concept of a 4-D Wx Single Authoritative Source (SAS). The 4-D Wx SAS is an optimal representation of all Air Navigation Service Provider (ANSP)-used weather information; is consistent in time, space, and among weather elements; is the source of weather information for Air Traffic Management (ATM)-related decisions; and is accessible by all those with access rights to Cube data. The 4-D Wx SAS provides a common weather picture that facilitates shared situational awareness and eliminates the need to choose among potentially conflicting weather "products." Additionally, the 4-D Wx SAS provides for predictable decisions when combined with common business processes, and enables tailoring of weather information by automatically integrating multiple data sources.

The services and capabilities that enable access to the 4-D Wx Data Cube and the NNEW System's contents include, but are not limited to:

[4] NextGen Weather Concept of Operations, Version 1.4, March 15, 2006

[5] NextGen Weather Policy Findings and Recommendations, Version 0.1, October 31, 2007

[6] The JPDO specifically refers to the 4-D Wx Data Cube in its documentation, which is the combined functionality of the 4-D Wx Data Cube and the NNEW System.

- Discovery of available weather products, their characteristics, and their associated terms of use. This capability will be provided by a registry/repository that contains metadata about the weather products. (Metadata is structured information that describes, explains, locates, or otherwise makes it easier to retrieve, use, or manage an information resource. Metadata are "data about data.")
- Data access services. These services will be provided by a messaging service that will use NOAA's Ops~~PS~~Net and ATC Communications services for transport. The Messaging service will enable weather product producers to publish their products and weather product consumers to subscribe to the products they need.

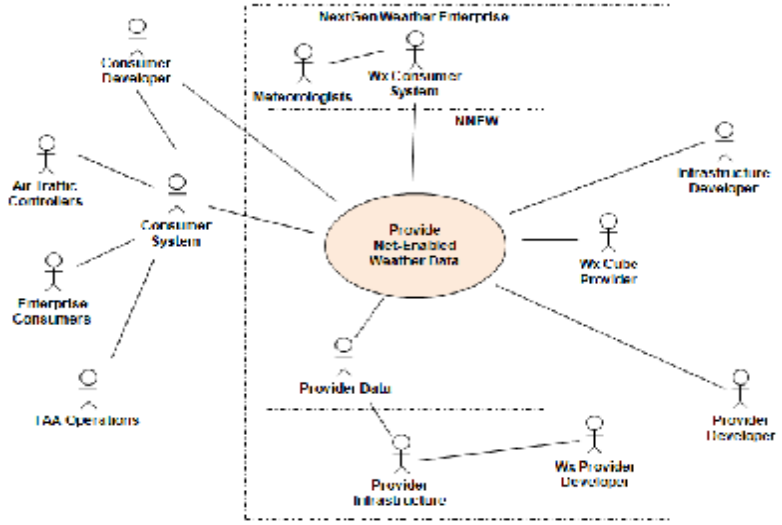

Figure 1: Unified Modeling Language Diagram Showing NNEW System

Figure 1 shows a high-level, Unified Modeling Language (UML) diagram of the NextGen Weather Enterprise. At the center of the figure is the use case to "Provide Net-Enabled Weather Data," as stated in the Joint Planning and Development Office (JPDO) Weather Concept of Operations (CONOPS). This NextGen weather objective is the primary motivator behind the development of the 4-D Wx Data Cube and the NNEW System. "Provider Data" and "Provider Infrastructure" have been separated toward the bottom of the figure to denote that the data are a

part of the NNEW System and the 4-D Wx Data Cube, while the algorithms, hardware, software, etc., that make up the provider are not. The NextGen Weather Enterprise consists of those systems, programs, and agencies who are working to institute the NextGen concept of mitigating the negative effects of weather on air transportation. The other primary and secondary actors in the diagram are self explanatory.

2 OPERATIONAL CONCEPT

2.1 Operations

According to the NextGen Weather CONOPS,[7] weather service dissemination improvements to support safe, effective, and efficient NextGen operations begin with the NNEW System. To accomplish this, the NNEW Program will implement network-enabled information dissemination capabilities to realize flexible and cost-efficient access to weather information. Aviation weather information required by NAS users will be available via network-centric services. These services will be based on Service Oriented Architecture (SOA) design principles.

2.1.1 NOAA's 4-D Wx Data Cube

NOAA will provide the 4-D Wx Data Cube, which contains weather information from NOAA, from internal FAA sources, and other potential sources (e.g., foreign countries and private sources). That weather information will cover elements of convection, winds, turbulence, in-flight icing, and obstructions to vision and other meteorological phenomena that impact aviation.

2.1.2 NNEW Functions and Services

NNEW will subsume the functionality of the Weather and Radar Processor (WARP), Weather Information Network Server (WINS), and Corridor Integrated Weather System (CIWS) Data Distribution Service (DDS). In addition, it will provide weather information to the replacement for the WARP Briefing Terminals, provide weather information to the NextGen Weather Processor (NWP), and disseminate NWP's products.

The development of the NNEW System includes the creation of Service Adaptors (SA) that will provide an interface for each legacy system that requires access to it. The SA interface creates a communications bridge so that legacy systems can provide or consume data to/from the NNEW System without the need for modification. There are two types of SAs: Consumer Service Adaptors (CSA) and Provider Service Adaptors (PSA).

An important aspect of the NNEW System and the 4-D Wx Data Cube is that they will use their own native weather data formats, conventions, and reference models that will be different from those of legacy providers. These native formats will make it feasible for the NNEW System to

[7] *NextGen Weather Concept of Operations*, Version 1.3.34, March September, 30, 201015, 2006.

extract or subset data so that consuming systems receive only the data that they need. For example, some datasets cover large geographic areas (e.g., North America). By filtering the data, the NNEW System will enable a consuming system to receive only that part of a data set that satisfies its needs. This reduces latency, communication costs, and processing overhead for the consuming system.

Services of the NNEW System and the 4-D Wx Data Cube will be developed in accordance with Open Geospatial Consortium (OGC)[8] standards. These include three OGC-defined service standards: Web Feature Service (WFS), and Web Coverage Service (WCS), and Web Map Service (WMS). The NNEW Program is developing Reference Implementations (RI) that will implement the WFS and WCS and service standards. The RI is a software application that provides a definitive interpretation and implementation of a standard.

Another important element of the NNEW System is discovery, or how the consumer finds and gains access to weather data. Consumers use a federated discovery mechanism to understand what data are available from both the NNEW System and the 4-D Wx Data Cube. In turn, the consumer can use the discovered products and data to develop new products and information.

[8] For information on OGC go to http://www.opengeospatial.org/

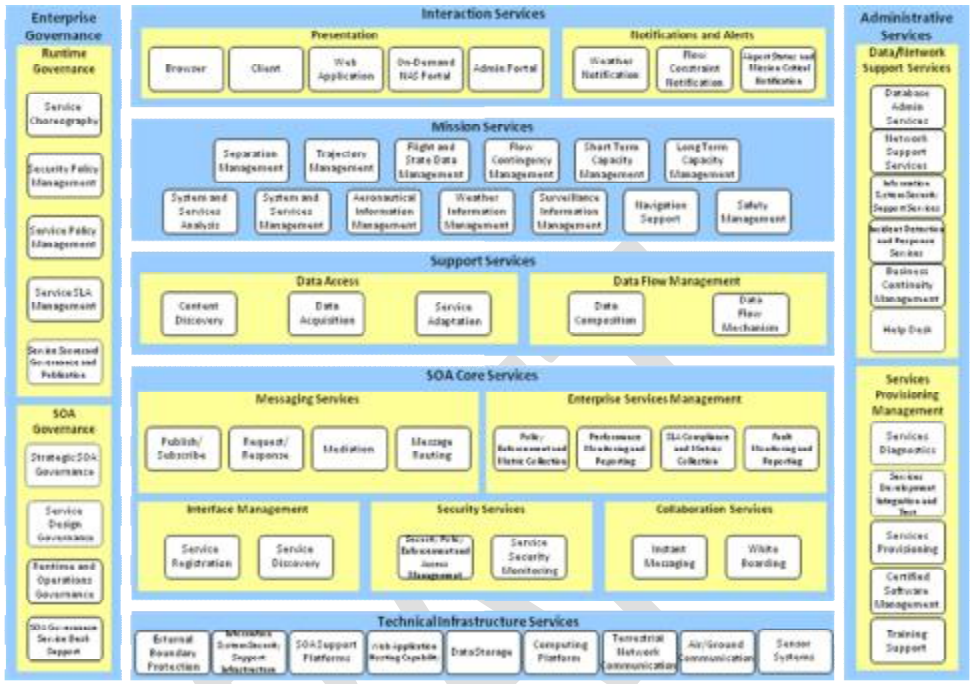

Figure 2: Weather Related Service Functional Layers

The NNEW System services will require physical infrastructure (new hardware), logical infrastructure (new software), reuse of legacy NAS resources, and a federation of virtual services and resources to be modified or deployed throughout the NAS. The infrastructure has been/will be deployed in a time-phased and distributed manner, which ensures efficient and universal dissemination. The NNEW System will connect all the FAA NextGen operational nodes in accordance with the NextGen Enterprise Architecture Framework System View-4 (SV-4).

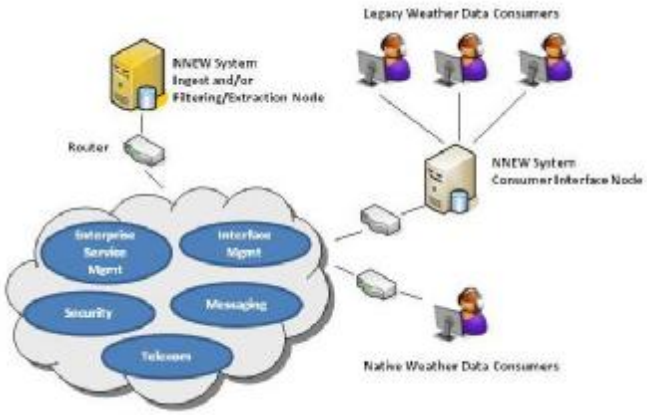

Figure 3: High-Level Notional Architecture of NNEW

The notional high-level NNEW System architecture, as pictured in Figure 3~~Figure 3~~, includes a function to ingest data from data providers (e.g., ITWS); a filtering/extraction function; interface management, including discovery; telecommunications, enterprise service management, security, and messaging functions; and the functionality to interface to consumers. Notionally, the ingest function will be collocated with provider systems (e.g., ITWS) and the interface to consumer systems with consumer systems at the Air Traffic Control System Command Center, ARTCCs, and larger Terminal Radar Approach Control Facilities (TRACON). The filtering/extraction function will be deployed to various locations. The interface management function will likely reside at FAA Telecommunications Infrastructure (FTI) Gateway locations. Additional air traffic control facilities will be connected to nearby nodes. These servers will host SAs and other specific software applications, as applicable. In addition to the above, the NNEW System will utilize infrastructure and services provided by FTI and SWIM. As pictured in Figure 3, the SWIM System represents the consolidated messaging infrastructure and core services of the NAS. FTI will provide the necessary communications infrastructure within FAA as well as provide the NAS Enterprise Security Gateways (NESG). The NESGs will provide connections to providers and consumers that are outside the bounds of the FAA and also will provide a communications bridge to NOAA's Ops~~PS~~Net.

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The NNEW System will provide data access through an architecture designed primarily to accommodate access to aviation weather data and utilize the SWIM System for disseminating data. This access will support push and pull delivery in the form of ad hoc requests and

publish/subscribe message exchange patterns. Through SWIM System messaging, the NNEW System will be able to aggregate overlapping requests to disseminate geographically and temporally sub-setted data according to the needs of end users, as detailed in section 1.2.

2.2 Maintenance

The NNEW Program is in the AMS Initial Investment Analysis phase, evaluating alternatives for viability leading to the Initial Investment Decision (IID). Maintenance concepts are being considered and will be in accordance with AMS Lifecycle management processes and FAA Order 6000.30 National Airspace System Maintenance Policy, and FAA Order 6000.15 General Maintenance Handbook for Airway Facilities. A more specific maintenance concept will be provided once the preferred alternative is designated by the Joint Resources Council (JRC). All NNEW prototype and first article hardware and software maintenance activities will be the responsibility of the prime Contractor (for solution development), until a production configuration of the NNEW System achieves key site Operational Readiness Demonstration (ORD) at which time FAA Airway Facilities or Contractor support personnel will perform first level, on-site maintenance. Maintenance options will ultimately be exercised based on the maintenance contract deliverables supplied by the prime Contractor. Second level support will be provided from either of two, second-level, off-site locations, i.e., WJHTC (second-level engineering), or one of the two spares depots (FAA's Logistics Center, or prime Contractor's commercial spare depot.

2.2.1 Hardware Maintenance

The NNEW System will be comprised of a common family of Non-Developmental Items based on a majority of Commercial Off-the-Shelf (COTS) computers and telecommunication devices to the maximum extent practicable. Less than 15% of the NNEW hardware will be fully developmental. As such, the maintenance documentation will be comprised of COTS manuals, with minor modifications, supplemented by a small, but not insignificant portion of original work to organize COTS parts and maintenance processes into the larger system processes and to fill in any voids in areas of maintenance between the COTS subsystems. In the event fee-for-service organic maintenance is less cost effective than outsourcing to private industry, NNEW's lifecycle maintenance plans will be finalized during AMS Phase 3 following the Logistic Support Analysis Conference. Planned FAA maintenance actions include:

- Periodic Maintenance, (per Original Equipment Manufacturer direction) including performance checks and status monitoring, and routine maintenance
- Corrective Maintenance, including restoration, troubleshooting, system reset & reconfiguration, repair and replacement, alignment and tuning, and parameter setting

- Certification, including initial, periodic, and after-corrective maintenance, as well as post accident/incident evaluation
- Modification, including installation of system support modifications and functional check-out/testing

As a design goal, any NNEW System processing components must be monitored via the automated NAS Remote Maintenance and Monitoring System (RMMS) or equivalent.

2.2.2 Software Maintenance

The prime Contractor for NNEW System development will provide systems and applications software maintenance support until Operational Readiness Decision is achieved, Interim Contractor Software Support until the Program Support Facility (PSF) is functional, and on-call software maintenance thereafter. The Government is responsible for configuration management of the software after configuration control handoff to the PSF. The FAA will establish a transitional period leading up to PSF handoff, at which time the NNEW System Software Product Baseline will be established at Functional Configuration Audit/Physical Configuration Audit and software maintenance responsibilities will be turned over from the Contractor to the FAA. These responsibilities include:

- Maintaining the production NNEW System software
- Investigating software problems
- Resolving Problem Trouble Reports
- Incorporating approved software changes, as directed.
- Maintain system supportability metrics

2.2.2.1 Software Support

The Contractor will provide on-call software support after the product baseline has been established. The intent of this on-call support is to assist the Government in the resolution of software problems. The National Engineering Field Support Division is responsible for NNEW System configuration control for both hardware and software upon FAA acceptance of the NNEW System, as well as life-cycle engineering support of its software.

2.2.2.2 Integrated Monitor and Control

A goal of the NNEW Program is to create an integrated Monitor and Control (M&C) for the NNEW System components. Monitoring and display devices and their respective functions will be incorporated into the baseline architecture. They will be based on network management tools that provide open standards and protocols for monitoring and controlling equipment. A graphical user interface display will enable users to easily correlate and manage events, monitor network health, and gather performance data. The integrated M&C will have configurable M&C

monitoring screens that provide a view of the entire NNEW System network at a glance. AF's operational concept is to monitor and control all En Route systems from consoles within an integrated M&C system in the ARTCC.

2.3 Quantities and Location

The quantities and locations of the NNEW System components will be identified through provisioning performance analysis. Hardware and location will be identified as part of the final Program Requirements and are not available at this time.

2.4 Schedule Constraints

The NNEW Program development strategy is to segment investment packages and phase-in the full operational capability over ten years. In FY11, the initial NNEW System requirements and architecture was developed and standards for publishing and accessing NNEW data are complete. To verify the adequacy of the requirements and technology readiness, the FAA's NNEW Program conducted evaluations and demonstrations to resolve key technical questions and reduce implementation risk while assessing the operational benefits of a network-enabled weather environment to the FAA, other agencies, and aviation system users.

The Initial Operating Capability (IOC) of the NNEW System is scheduled for calendar year 2015. This will include the capability to access data in the 4-D Wx SAS.

External Program Dependency - In order to implement changes associated with NNEW, there will be a need for NAS infrastructure elements including SWIM and FTI. The NNEW System will depend on SWIM Core Services, so any delay in availability of needed SWIM System capabilities will adversely affect the NNEW Program's ability to deliver weather information contained in the NOAA 4-D Wx Data Cube.

3 TECHNICAL PERFORMANCE

3.1 Operational and Functional Requirements[9]

This section defines the operational and functional requirements imposed upon the NNEW System to satisfy the mission need. The NextGen CONOPS identifies eight transformational concepts as the driving factors for NextGen. The NNEW System specifically addresses two of these:

- Network-enabled information access (net-centric operations)
- Weather assimilated into decision making

The NNEW System and NOAA's 4-D Wx Data Cube support both of these concepts. Weather data in the NNEW System and the 4-D Wx Data Cube will be network-enabled. This allows all users to access weather data from a common source. The NNEW System provides data to NAS processes that determine the impact of weather on NAS operations resulting in weather assimilation into decision making.

The NNEW System and NOAA's 4-D Wx Data Cube will provide access to weather information that is used directly and indirectly for aviation decisions. This includes all relevant aviation weather information, including observations, analyses, forecasts (e.g., human and model output), and products from public and private sources. Weather data are composed of text products, graphic products, and machine-readable products. The weather products include products generated from the public domain, as well as products that are proprietary, from domestic and non-domestic sources. The NNEW System and NOAA's 4-D Wx Data Cube provide an extraction/filtering capability that allows the user to receive only the weather information needed thus reducing the impact on communications bandwidth otherwise required for decision makers to obtain highly accurate weather information.

The operational utilization of weather information by NAS users to reduce weather impact fulfills the NextGen weather objectives. The net-enabled access to weather information via the

[9] Traceability to NNEW/RWI pPR is provided in Appendix 1 and traceability to the functional analysis is found in Appendix 4

NNEW System meets the JPDO objectives for weather information dissemination.

The NNEW functional requirements describe the following high-level system functions identified below:

1. Perform Weather Discovery Management
2. Perform Weather Data Management
3. Perform Weather Service Management
4. Perform Weather Messaging
5. Perform Weather Security Management

3.1.1.1 Discover Weather Metadata

3.1.1.1.1 The NNEW System must perform design-time discovery of weather data based on inexact keyword matching of metadata.

3.1.1.1.2 The NNEW System must perform design-time discovery of weather data based on exact keyword matching.

3.1.1.1.3 The NNEW System must perform run-time discovery of weather data based on exact keyword matching.

3.1.1.1.4 The NNEW System must sort weather metadata responses.

3.1.1.1.5 The NNEW System must lookup relationships among weather metadata terms.

3.1.1.2 Manage Weather Metadata Notification Subscriptions

3.1.1.2.1 The NNEW System must add weather metadata notification subscriptions.

3.1.1.2.2 The NNEW System must update weather metadata notification subscriptions.

3.1.1.2.3 The NNEW System must remove weather metadata notification subscriptions.

3.1.1.2.4 Notify Weather Metadata Subscribers

3.1.1.2.4.1 The NNEW System must notify consumers when new weather metadata

are available.

3.1.1.2.4.2 The NNEW System must notify consumers of weather metadata changes.

3.1.1.3 Manage Weather Metadata

3.1.1.3.1 Update Weather Metadata Repository

3.1.1.3.1.1 The NNEW System must add weather metadata.

3.1.1.3.1.2 The NNEW System must modify weather metadata.

3.1.1.3.1.3 The NNEW System must remove weather metadata.

3.1.1.3.2 Store Metadata.

3.1.1.3.2.1 The NNEW System must store metadata for services.

3.1.1.3.2.2 The NNEW System must store metadata for products.

3.1.1.3.2.3 The NNEW System must store metadata for Named Geospatial Points.[10]

3.1.1.3.2.4 The NNEW System must store metadata for Named Geospatial Lines.[11]

3.1.1.3.2.5 The NNEW System must store metadata for Named Geospatial 2-D Polygons.[12]

3.1.1.3.2.6 The NNEW System must store metadata for Named Geospatial Circles.[13]

3.1.1.3.2.7 The NNEW System must store metadata for Named Geospatial 3-D

[10] A Geospatial Point is any point in space defined by a user-specified latitude, longitude, and altitude

[11] A Geospatial Line is any two geospatial points connected by a line segment

[12] A Geospatial 2-D Polygons is any two-dimensional polygon of regular or irregular shape.

[13] A Geospatial Circle is a two-dimensional plane of a circumscribed circle.

Polygons.[14]

3.1.1.3.2.8 The NNEW System must store metadata for Named Geospatial Cylinders.[15]

3.1.1.3.2.9 The NNEW System must store metadata for predefined queries.

3.1.1.3.3 The NNEW System must synchronize weather metadata among NNEW registries.

3.1.1.3.4 The NNEW System must federate weather metadata with non-NNEW registries (e.g., SWIM an NOAA).

3.1.2 Perform Weather Data Management

3.1.2.1 Reformat legacy Weather Data

3.1.2.1.1 The NNEW System must reformat gridded data into NetCDF4 format excluding data obtained directly from radar systems.

3.1.2.1.2 The NNEW System must reformat non-gridded weather data into WXXM format excluding data obtained directly from radar.

3.1.2.2 Store NNEW Weather Data

3.1.2.2.1 The NNEW System must store WXXM-formatted data products for a configurable amount of time based upon product category.

3.1.2.2.2 The NNEW System must store netCDF4 formatted data for a configurable amount of time based upon product category.

3.1.2.2.3 The NNEW System must store image file formatted data for a configurable amount of time based on product category.

[14] A Geospatial 3-D Polygons is a three-dimensional polygon of regular or irregular shape.

[15] A Geospatial Cylinder is a three-dimensional volume of a geometric shape that has parallel.

3.1.2.2.4 Store Weather Data Temporarily

3.1.2.2.4.1 The NNEW System must cache WXXM formatted data product until product refresh.

3.1.2.2.4.2 The NNEW System must cache NetCDF4 formatted data product until the product is refreshed.

3.1.2.2.4.3 The NNEW System must cache image file formatted data product until the product is refreshed.

3.1.2.2.4.4 The NNEW System must cache radar data until the data are refreshed.

3.1.2.3 Forward Radar Data

3.1.2.3.1 The NNEW System must disseminate the NEXRAD data without modification, when the NNEW System receives NEXRAD data directly from NEXRAD.

3.1.2.3.2 The NNEW System must disseminate NNEW-compressed TDWR data, when the NNEW System receives TDWR data directly from TDWR.

3.1.2.3.3 The NNEW System must disseminate CANRAD data without modification, when the NNEW System receives CANRAD data directly from CANRAD.

3.1.2.3.4 The NNEW System must disseminate ASR data without modification, when the NNEW System receives ASR data directly from ASR.

3.1.2.4 Filter Weather Data

3.1.2.4.1 Filter Weather Data by Geospatial Volumes, Areas, Lines, and Points.

3.1.2.4.1.1 The NNEW System must filter for weather data by a Geospatial Points.

3.1.2.4.1.2 The NNEW System must filter weather data by Named Geospatial Points.

3.1.2.4.1.3 The NNEW System must filter for weather data by Geospatial Lines.

3.1.2.4.1.4 The NNEW System must filter weather data by Named Geospatial

Lines.

3.1.2.4.1.5 The NNEW System must filter for weather data within a Geospatial 2-D Polygon.

3.1.2.4.1.6 The NNEW System must filter for weather data within Geospatial Circle.

3.1.2.4.1.7 The NNEW System must filter weather data by Named Geospatial 2-D Polygon.

3.1.2.4.1.8 The NNEW System must filter weather data by Named Geospatial Circle.

3.1.2.4.1.9 The NNEW System must filter weather data for geospatial areas defined by the union of any two-dimensional shapes. (***Includes polygons and circles).***

3.1.2.4.1.10 The NNEW System must filter for weather data within a Geospatial 3-D Polygon.

3.1.2.4.1.11 The NNEW System must filter for weather data within a Geospatial Cylinder.

3.1.2.4.1.12 The NNEW System must filter weather data by Named Geospatial 3-D Polygons.

3.1.2.4.1.13 The NNEW System must filter weather data by Named Geospatial 3-Cylinder.

3.1.2.4.1.14 The NNEW System must filter for weather data for a geospatial volume surrounding a user-specified line segment, a user-specified horizontal distance and a user-specified vertical distance above and below the line segments**.**

3.1.2.4.1.15 The NNEW System must filter weather data for geospatial volumes defined by the union of any two three-dimensional objects, includes cylinders and arbitrary volumes.

3.1.2.4.2 Filter Weather Data Temporally

3.1.2.4.2.1 The NNEW System must filter weather data by a user-defined time.

3.1.2.4.2.2 The NNEW System must filter weather data by a user-defined time range.

3.1.2.4.3 Threshold

3.1.2.4.3.1 The NNEW System must filter for weather data above a specified value of a weather parameter threshold.

3.1.2.4.3.2 The NNEW System must filter for weather data below a specified value of a weather parameter threshold.

3.1.2.5 Convert Weather Data

3.1.2.5.1 Convert Earth Model Datum

3.1.2.5.1.1 The NNEW System must convert weather data from spherical to NAD83 earth models/datum.

3.1.2.5.1.2 The NNEW System must convert weather data from spherical to WGS84 earth models/datum.

3.1.2.5.1.3 The NNEW System must convert weather data from NAD83 to spherical earth models/datum.

3.1.2.5.1.4 The NNEW System must convert weather data from WGS84 to spherical earth models/datum.

3.1.2.5.1.5 The NNEW System must convert weather data from NAD83 to WGS84 earth models/datum.

3.1.2.5.1.6 The NNEW System must convert weather data from WGS84 to NAD83 earth models/datum.

3.1.2.5.2 Convert between Measures of Altitude

3.1.2.5.2.1 The NNEW System must convert flight level to meters above Mean Sea

Level.

3.1.2.5.2.2 The NNEW System must convert flight level to feet Above Ground Level.

3.1.2.5.2.3 The NNEW System must convert flight level to feet above Mean Sea Level.

3.1.2.5.2.4 The NNEW System must convert flight level to standard pressure.

3.1.2.5.2.5 The NNEW System must convert meters above Mean Sea Level to flight level.

3.1.2.5.2.6 The NNEW System must convert meters above Mean Sea Level to feet Above Ground Level.

3.1.2.5.2.7 The NNEW System must convert meters above Mean Sea Level to feet above Mean Sea Level.

3.1.2.5.2.8 The NNEW System must convert meters above Mean Sea Level to standard atmospheric pressure.

3.1.2.5.2.9 The NNEW System must convert feet Above Ground Level to flight level.

3.1.2.5.2.10 The NNEW System must convert feet Above Ground Level to meters above Mean Sea Level.

3.1.2.5.2.11 The NNEW System must convert feet Above Ground Level to feet above Mean Sea Level.

3.1.2.5.2.12 The NNEW System must convert feet Above Ground Level to standard pressure.

3.1.2.5.2.13 The NNEW System must convert feet above Mean Sea Level to flight level.

3.1.2.5.2.14 The NNEW System must convert feet above Mean Sea Level to meters above Mean Sea Level.

3.1.2.5.2.15 The NNEW System must convert feet above Mean Sea Level to feet Above Ground Level.

3.1.2.5.2.16 The NNEW System must convert feet above Mean Sea Level to standard pressure.

3.1.2.5.2.17 The NNEW System must convert standard pressure to flight level.

3.1.2.5.2.18 The NNEW System must convert standard pressure to meters above Mean Sea Level.

3.1.2.5.2.19 The NNEW System must convert standard pressure to feet Above Ground Level.

3.1.2.5.2.20 The NNEW System must convert standard pressure to feet above Mean Sea Level.

3.1.2.5.2.21 The NNEW System must convert wind direction between true north and magnetic north.

3.1.2.5.2.22 The NNEW System must convert between US customary units and metric units.

3.1.2.6 Transform Weather Map Projections

3.1.2.6.1 The NNEW System must re-project weather data from Lambert Conformal Conic map projection to Lambert Azimuthal Equal-Area map projection.

3.1.2.6.2 The NNEW System must re-project weather data from Lambert Conformal Conic to Latitude/Longitude map projection map projection.

3.1.2.6.3 The NNEW System must re-project weather data from Lambert Conformal Conic to Mercator map projection.

3.1.2.6.4 The NNEW System must re-project weather data from Lambert Conformal Conic to Stereographic (including polar) map projection.

3.1.2.6.5 The NNEW System must re-project weather data from Lambert Conformal Conic to Polar Radar map projection.

3.1.2.6.6 The NNEW System must re-project weather data from Lambert Conformal Conic to NAS Projection map projection.

3.1.2.6.7 The NNEW System must re-project weather data from Lambert Conformal Conic to Cartesian map projection.

3.1.2.6.8 The NNEW System must re-project weather data from Lambert Azimuthal Equal-Area to Lambert Conformal Conic map projection.

3.1.2.6.9 The NNEW System must re-project weather data from Latitude/Longitude to Lambert Conformal Conic map projection.

3.1.2.6.10 The NNEW System must re-project weather data from Latitude/Longitude to Lambert Azimuthal Equal-Area map projection.

3.1.2.6.11 The NNEW System must re-project weather data from Latitude/Longitude to Mercator map projection.

3.1.2.6.12 The NNEW System must re-project weather data from Latitude/Longitude to Stereographic (including polar) map projection.

3.1.2.6.13 The NNEW System must re-project weather data from Latitude/Longitude to Polar Radar map projection.

3.1.2.6.14 The NNEW System must re-project weather data from Latitude/Longitude to NAS Projection map projection.

3.1.2.6.15 The NNEW System must re-project weather data from Latitude/Longitude to Cartesian map projection.

3.1.2.6.16 The NNEW System must re-project weather data from Mercator to Lambert Conformal Conic map projection.

3.1.2.6.17 The NNEW System must re-project weather data from Mercator to Lambert Azimuthal Equal-Area map projection.

3.1.2.6.18 The NNEW System must re-project weather data from Mercator to Latitude/Longitude map projection.

3.1.2.6.19 The NNEW System must re-project weather data from Mercator to Stereographic (including polar) map projection.

3.1.2.6.20 The NNEW System must re-project weather data from Mercator to Polar Radar map projection.

3.1.2.6.21 The NNEW System must re-project weather data from Mercator to NAS Projection map projection.

3.1.2.6.22 The NNEW System must re-project weather data from Mercator to Cartesian map projection.

3.1.2.6.23 The NNEW System must re-project weather data from Stereographic (including polar) to Lambert Conformal Conic map projection.

3.1.2.6.24 The NNEW System must re-project weather data from Stereographic (including polar) to Lambert Azimuthal Equal-Area map projection.

3.1.2.6.25 The NNEW System must re-project weather data from Stereographic (including polar) to Latitude/Longitude map projection.

3.1.2.6.26 The NNEW System must re-project weather data from Stereographic (including polar) to Mercator map projection.

3.1.2.6.27 The NNEW System must re-project weather data from Stereographic (including polar) to Polar Radar map projection.

3.1.2.6.28 The NNEW System must re-project weather data from Stereographic (including polar) to NAS Projection map projection.

3.1.2.6.29 The NNEW System must re-project weather data from Stereographic (including polar) to Cartesian map projection.

3.1.2.6.30 The NNEW System must re-project weather data from Polar Radar to Lambert Conformal Conic map projection.

3.1.2.6.31 The NNEW System must re-project weather data from Polar Radar to Lambert Azimuthal Equal-Area map projection.

3.1.2.6.32 The NNEW System must re-project weather data from Polar Radar to Latitude/Longitude map projection.

3.1.2.6.33 The NNEW System must re-project weather data from Polar Radar to Mercator map projection.

3.1.2.6.34 The NNEW System must re-project weather data from Polar Radar to Stereographic (including polar) map projection.

3.1.2.6.35 The NNEW System must re-project weather data from Polar Radar to NAS Projection map projection.

3.1.2.6.36 The NNEW System must re-project weather data from Polar Radar to Cartesian map projection.

3.1.2.6.37 The NNEW System must re-project weather data from NAS Projection to Lambert Conformal Conic map projection.

3.1.2.6.38 The NNEW System must re-project weather data from NAS Projection to Lambert Azimuthal Equal-Area map projection.

3.1.2.6.39 The NNEW System must re-project weather data from NAS Projection to Latitude/Longitude map projection.

3.1.2.6.40 The NNEW System must re-project weather data from NAS Projection to Mercator map projection.

3.1.2.6.41 The NNEW System must re-project weather data from NAS Projection to Stereographic (including polar) map projection.

3.1.2.6.42 The NNEW System must re-project weather data from NAS Projection to Polar Radar map projection.

3.1.2.6.43 The NNEW System must re-project weather data from NAS Projection to Cartesian.

3.1.2.7 Reduce Geographic Resolutions

3.1.2.7.1 The NNEW System must lower the geographic resolution of gridded weather

data products in accordance with a user specified resolution.

3.1.2.7.2 The NNEW System must lower the resolution of gridded weather data parameters by quantizing parameters in accordance with a user specified quantization range.

3.1.2.7.3 The NNEW System must lower the resolution of gridded weather data in accordance with user specified quantization ranges of polygons that describe areas of equal or greater values of a parameter.

3.1.2.8 Reformat NNEW-Formatted Weather Data

3.1.2.8.1 The NNEW System must reformat NetCDF4 formatted data into specified legacy formats in accordance with NAS Legacy Automation System ICDs.

3.1.2.8.2 The NNEW System must reformat NetCDF4 formatted data into GRIB2 data format.

3.1.2.8.3 The NNEW System must reformat WXXM formatted data into specified legacy formats in accordance with NAS Legacy Automation System ICDs.

3.1.2.9 Process Weather Data Request

3.1.2.9.1 The NNEW System must retrieve persistent gridded weather data.

3.1.2.9.2 The NNEW System must retrieve persistent non-gridded weather data.

3.1.2.9.3 The NNEW System must retrieve persistent map image weather data.

3.1.2.9.4 The NNEW System must retrieve persistent weather radar data.

3.1.2.10 Perform Complex Requests

3.1.2.10.1 The NNEW System must process Complex Retrieval[16] requests. (Requests

[16] A query service of the NNEW System where consumers can send a single query to produce multiple products, multiple product types, and/or multiple formats that are aggregated into an NNEW-specific format and returned to the consumer as a

for multiple data)

3.1.2.10.2 The NNEW System must compose a single response in order to satisfy a Complex Retrieval request.

3.1.2.10.3 Compress-Uncompress TDWR Data

3.1.2.10.3.1 The NNEW System must compress uncompressed TDWR data.

3.1.2.10.3.2 The NNEW System must uncompress compressed TDWR data.

3.1.2.10.4 Generate Weather Alerts

3.1.2.10.4.1 The NNEW System must set user-specified weather parameter value threshold(s) within a user-specified geospatial volume.

3.1.2.10.4.2 The NNEW System must monitor weather parameter value threshold(s).

3.1.2.10.4.3 The NNEW System must generate alerts based on user-specified weather parameter value threshold(s).

3.1.3 Manage Weather Service Performance

3.1.3.1 Monitor Performance

3.1.3.1.1 The NNEW System must monitor throughput.

3.1.3.1.2 The NNEW System must monitor availability.

3.1.3.1.3 The NNEW System must monitor weather service usage.

3.1.3.1.4 The NNEW System must monitor response time.

3.1.3.1.5 The NNEW System must monitor operational state changes.

3.1.3.1.6 The NNEW System must monitor data storage availability.

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single response

3.1.3.1.7 The NNEW System must monitor faults.

3.1.3.1.7.1 Detect Faults

3.1.3.1.7.1.1 The NNEW System must detect hardware faults.

3.1.3.1.7.1.2 The NEW System must detect software faults.

3.1.3.1.7.2 Isolate Faults

3.1.3.1.7.2.1 The NNEW System must isolate hardware faults.

3.1.3.1.7.2.2 The NNEW System must isolate software faults.

3.1.3.1.7.3 Diagnose faults

3.1.3.1.7.3.1 The NNEW System must trace faults to the source.

3.1.3.1.7.3.2 The NNEW System must diagnose hardware faults.

3.1.3.1.7.3.3 The NNEW System must diagnose software faults.

3.1.3.2 The NNEW System must monitor SLA Compliance.

3.1.3.3 Report Weather Service Performance

3.1.3.3.1 Create Reports

3.1.3.3.1.1 The NNEW System must produce performance reports upon request.

3.1.3.3.1.2 The NNEW System must produce routine performance reports as pre-defined by user.

3.1.3.3.1.3 Report Software Faults

3.1.3.3.1.3.1 The NNEW System software fault report must include the identity of the NNEW component.

3.1.3.3.1.3.2 The NNEW System software fault report must include the type of fault.

3.1.3.3.1.3.3 The NNEW System software fault report must identify the level of error (i.e., critical, non-critical).

3.1.3.3.1.3.4 The NNEW System software fault report must identify the time an error occurred.

3.1.3.3.1.3.5 The NNEW System software fault report must identify any alerts that were generated as a result of an error.

3.1.3.3.1.3.6 The NNEW System software fault report must identify the actions that were taken to isolate or correct an error.

3.1.3.3.1.4 Report Hardware Faults

3.1.3.3.1.4.1 The NNEW System hardware fault report must include the identity of the NNEW component.

3.1.3.3.1.4.2 The NNEW System hardware fault report must include the type of fault.

3.1.3.3.1.4.3 The NNEW System hardware fault report must identify the level of an error (i.e., critical, non-critical).

3.1.3.3.1.4.4 The NNEW System hardware fault report must identify the time an error occurred.

3.1.3.3.1.4.5 The NNEW System hardware fault report must identify any alerts that were generated as a result of an error.

3.1.3.3.1.4.6 The NNEW System hardware fault report must identify the actions that were taken to isolate or correct an error.

3.1.3.3.1.5 Report Usage Statistics

3.1.3.3.1.5.1 The NNEW System must report product usage statistics.

3.1.3.3.1.5.2 The NNEW System must report dataset usage statistics.

3.1.3.3.1.5.3 The NNEW System must report service usage statistics.

3.1.3.3.1.5.4 The NNEW System must report performance statistics.

3.1.3.3.1.6 The NNEW System must store reports.

3.1.3.3.2 Create Logs

3.1.3.3.2.1 Log Events

3.1.3.3.2.1.1 The NNEW System Event Log must include the event type.

3.1.3.3.2.1.2 The NNEW System Event Log must include the specific event that triggered the log entry.

3.1.3.3.2.1.3 The NNEW System Event Log must include the time of the event.

3.1.3.3.2.1.4 The NNEW System Event Log must include any alerts generated as a result of the event.

3.1.3.3.2.2 Log Requests for Information

3.1.3.3.2.2.1 The NNEW System Requests for Information Log must include the original request for weather information.

3.1.3.3.2.2.2 The NNEW System Requests for Information Log must include the identity of the requestor.

3.1.3.3.2.2.3 The NNEW System Requests for Information Log must include the time of the request.

3.1.3.3.2.2.4 The NNEW System Requests for Information Log must include an indication if the request was fulfilled or not.

3.1.3.3.2.2.5 The NNEW System Requests for Information Log must include the identity of the provider that fulfilled the request.

3.1.3.3.2.3 Log NNEW Configuration Changes

3.1.3.3.2.3.1 The NNEW System Configuration Change Log must include description of the configuration change.

3.1.3.3.2.3.2 The NNEW System Configuration Change Log must include the date of the configuration change.

3.1.3.3.2.3.3 The NNEW System Configuration Change Log must include the time of the configuration change.

3.1.3.3.2.4 Store Logs

3.1.3.3.2.4.1 The NNEW System must store logs for 15 days.

3.1.3.3.2.5 Generate Service Performance Alerts

3.1.3.3.2.5.1 The NNEW System must configure alert thresholds as specified by a user.

3.1.3.3.2.5.2 The NNEW System must generate alerts when performance thresholds are not met.

3.1.3.3.2.5.3 The NNEW System must send hardware fault alerts to a centralized support facility.

3.1.3.3.2.5.4 The NNEW System must send software fault alerts to a centralized support facility.

3.1.3.4 Manage Weather Service Performance

3.1.3.4.1 Recover from Faults

3.1.3.4.1.1 The NNEW System must automatically recover from hardware faults.

3.1.3.4.1.2 The NNEW System must automatically recover from software faults.

3.1.3.4.1.3 The NNEW System must switch from current software baseline to previous software baseline.

3.1.3.4.1.4 The NNEW System must switch from previous software baseline to current software baseline.

3.1.3.4.2 Maintain Wx Service Performance Levels

3.1.3.4.2.1 The NNEW System must configure performance thresholds as specified by a user.

3.1.3.4.2.2 The NNEW System must calculate variance between actual performance and pre-defined performance thresholds as specified in a Service-Level Agreement.

3.1.3.4.2.3 The NNEW System must recover when Service-Level Agreement performance requirements are not met.

3.1.3.4.3 Enforce Governance Policies.

3.1.3.4.3.1 The NNEW System must configure service management policies as specified by a user.

3.1.3.4.3.2 The NNEW System must apply service management policies.

3.1.3.4.3.3 Control weather service endpoints.

3.1.3.4.3.3.1 The NNEW System must start weather service endpoints.

3.1.3.4.3.3.2 The NNEW System must stop weather service endpoints.

3.1.3.4.3.3.3 The NNEW System must kill weather service endpoints.

3.1.3.5 Perform Administrative Functions

3.1.3.5.1 The NNEW System must provide the capability to manage performance threshold values.

3.1.3.5.2 The NNEW System must provide the capability to manage user access permissions.

3.1.3.5.3 The NNEW System must provide the capability to manage configuration files (e.g., create and modify configuration files).

3.1.3.5.4 The NNEW System must provide the capability to manage software configuration (e.g. install and run new software).

3.1.3.5.5 The NNEW System must provide the capability to manage hardware

configuration (e.g., disable remote server)

3.1.3.6 The NNEW System perform browser-interface management

3.1.4 Manage Security

3.1.4.1 Detect Intrusions

3.1.4.1.1 The NNEW System must detect unauthorized intrusion to the NNEW System.

3.1.4.1.2 The NNEW System must send intrusion detection information to a centralized NAS intrusion detection facility.

3.1.4.2 System and Communication Protection

3.1.4.2.1 The NNEW System must connect to any network or system external to the FAA security boundary through an FTI NAS Enterprise Security Gateway service in accordance with FAA Order JO 1370.44.

3.1.4.2.2 The NNEW system must protect access to the Internet in accordance with FAA Order 1370.83, Internet Access Points and FAA Order 1370.84, Internet Services.

3.1.4.2.3 The NNEW System must receive data from external NAS entities through a boundary-based proxy.

3.1.4.2.4 The NNEW System must send data to external NAS entities through a boundary-based proxy.

3.1.4.2.5 The NNEW System must interface with external NAS entities through a boundary based proxy.

3.1.4.2.6 The NNEW system must monitor and control communications at the external boundary of the information system and at key internal boundaries within the system.

3.1.4.2.7 The NNEW System must stage data for access at the NAS security boundary.

3.1.4.2.8 The NNEW System must employ automated mechanisms to assist in the reporting of security incidents.

3.1.4.3 Inspect Weather Data

3.1.4.3.1 The NNEW System must inspect weather data at the enterprise boundary for validation.

3.1.4.4 Secure Messages

3.1.4.4.1 The NNEW System must verify weather message integrity.

3.1.4.4.2 The NNEW System must verify the weather message confidentiality when sending or receiving data to external entities.

3.1.4.5 Control Access to NNEW Resources

3.1.4.5.1 Identification and Authentication

3.1.4.5.1.1 The NNEW System must uniquely identify users.

3.1.4.5.1.2 The NNEW System must uniquely identify processes acting on behalf of users.

3.1.4.5.1.3 The NNEW System must uniquely identify specific devices before establishing a connection.

3.1.4.5.1.4 The NNEW System must authenticate users.

3.1.4.5.1.5 The NNEW System must authenticate processes acting on behalf of users.

3.1.4.5.1.6 The NNEW System must authenticate specific devices before establishing a connection.

3.1.4.5.2 Control Access

3.1.4.5.2.1 The NNEW System must enforce role based authorizations for controlling access to the system.

3.1.4.5.2.2 The NNEW system must verify the identity of external NAS entities through the use of a mutually trusted authentication mechanism.

3.1.4.5.2.3 The NNEW system must authorize access to external NAS entities based on the authenticated identity.

3.1.4.5.2.4 The NNEW System must limit access to NNEW system resources to authorized internal users.

3.1.4.5.2.5 The NNEW System must limit access to NNEW system resources to authorized processes acting on behalf of authorized internal user.

3.1.4.5.2.6 The NNEW System must enforce the most restrictive set of access privileges needed by entities requiring authorization as defined in NIST 800.53, in accordance with FAA Order 1370.92A.

3.1.4.5.2.7 The NNEW System must employ automated mechanisms in accordance with FAA Order 1370.92A, Password and PIN Management.

3.1.4.5.2.8 The NNEW System must employ automated mechanisms in accordance with FAA Order 1370.102, System Use Notification and Disclaimer.

3.1.5 Support Subscription of Consumers for Publish-Subscribe Message Exchange.

3.1.5.1 Subscribe Weather Consumer

3.1.5.1.1 Accept Subscriptions to Weather Data

3.1.5.1.1.1 The NNEW System must register a consumer for receiving data from a Topic Messaging Channel.

3.1.5.1.1.2 The NNEW System must register a consumer for receiving data from a Queue Messaging Channel.

3.1.5.2 Publish Weather Messages

3.1.5.2.1 The NNEW System must publish message to a Queue Messaging Channel (e.g. point to point).

3.1.5.2.2 The NNEW System must publish notification messages to a Queue Messaging Channel.

3.1.5.2.3 The NNEW System must publish alert messages to Queue Messaging Channel.

3.1.5.2.4 The NNEW System must publish messages at user specified intervals to a Queue Messaging Channel.

3.1.5.2.5 Service Publication of Weather Data to all Consumers.

3.1.5.2.5.1 The NNEW System must publish alerts to Topic Messaging channels.

3.1.5.2.5.2 The NNEW System must publish messages at user specified intervals to Topic Messaging channels.

3.1.5.2.5.3 The NNEW System must publish messages at user specified intervals to Topic weather consumers.

3.1.5.2.6 Process Request Response Message Exchange Protocols for the Weather Consumers.

3.1.5.2.6.1 The NNEW System must process request messages for weather data.

3.1.5.2.6.2 The NNEW System must process a response to a request for weather data.

3.1.5.2.7 Mediate between Producers and Consumers Utilizing SOA Protocols.

3.1.5.2.7.1 The NNEW System must mediate message transport protocols to ensure messaging compatibility between the NNEW System and NAS Automation Systems.

3.1.5.2.7.2 The NNEW System must encode and decode messaging protocols to ensure messaging compatibility.

3.1.5.2.8 Route Message

3.1.5.2.8.1 The NNEW System must process runtime message routing.

3.1.5.2.9 Perform Priority Messaging

3.1.5.2.9.1 The NNEW System must perform Topic Message Channel priority messaging.

3.1.5.2.9.2 The NNEW System must perform Queue Message Channel priority messaging.

3.1.5.2.9.3 The NNEW System must perform Ad Hoc Request response priority messaging.

3.2 Product Characteristics and Performance Requirements

This section describes product characteristics and performance requirements for NNEW. Product characteristics are defined as Service levels including the Mode of Operation and Quality of Service. The Modes of Operation include the Operational Mode, Degraded Mode and Maintenance Mode. System Performance requirements are described in terms of operational availability, elapsed time between failure and the time it takes to restore the system. The NNEW system is required to exceed the weather information management requirements of section 3.1.10 of National Airspace System (NAS) Requirements Document.

3.2.1 Service Levels

3.2.1.1.1 Mode of Operation

3.2.1.1.1.1 The NNEW System must perform a system Self Check prior to advancing into Operational Mode.

3.2.1.1.1.2 The NNEW System must switch into Degraded Mode from Operational Mode when Service Level Objectives have not been met for at least two product update cycles.

3.2.1.1.1.3 Maintenance Mode

3.2.1.1.1.3.1 The NNEW System must operate in Preventive Maintenance Mode when physical components are undergoing maintenance.

3.2.1.1.1.3.2 The NNEW System must operate in Corrective Maintenance Mode when physical component are undergoing repair.

3.2.2 Quality of Service

3.2.2.1.1 The NNEW Program must categorize weather products in terms of the NNEW Quality of Service (QoS) Priority Scheme (Critical, High, Routine or Best Effort).[17]

3.2.2.1.2 When operating in a Degraded Mode, the NNEW System must disseminate weather products in accordance with the NNEW Program's Quality of Service (QoS) Priority Scheme.

3.2.3 System Performance

3.2.3.1 The NNEW System operational availability must be equal or greater than 0.9999.

3.2.3.2 The NNEW System Mean Time Between Failure (MTBF) must be equal to or greater than 5000 hours.

3.2.3.3 The NNEW System Mean Time to Restore (MTTR) must be less than or equal to 0.5 hours.

3.2.3.4 The NNEW System must support dissemination of weather information based on the NNEW SV-6c with update rates greater than or equal to (>) 1 hour with a maximum one-way response time of 420 (TBR) seconds , assuming a 90% (TBR) sub-setting factor.

3.2.3.5 The NNEW System must support dissemination of weather information based on the NNEW SV-6c having update rates less than or equal to (<) 1 hour and greater than or equal to (>) 15 minutes with a maximum one-way response time of 60 (TBR) seconds, assuming a 90% (TBR) sub-setting factor.

3.2.3.6 The NNEW System must support dissemination of weather information based on the NNEW SV-6c having update rates of less than or equal to (<) 15 minutes and greater than or equal to (>) 5 minutes with a maximum one-way response time of 30 (TBR) seconds (objective) and 60 (TBR) seconds (threshold), assuming a 90% (TBR) sub-

[17] FTI QoS Scheme reference document to be inserted.

setting factor.

3.2.3.7 The NNEW System must support dissemination of weather information based on the NNEW SV-6c having update rates less than (<) 5 minutes and greater than or equal to (>) 1 minute with a maximum one-way response time of 5 (TBR) seconds (objective) and 30 (TBR) seconds (threshold), assuming a 90% (TBR) sub-setting factor.

3.2.3.8 The NNEW system must handle TBD end to end customer transactions per second (TPS).

3.2.4 Enhanceability

3.2.4.1 The NNEW System must be extensible. (Designed to include hooks and mechanisms for expanding/enhancing the system with new capabilities without having to make major changes to the system infrastructure).

3.2.4.2 In-service Upgrades

3.2.4.2.1 The NNEW System must operate at required availability while adding new hardware.

3.2.4.2.2 The NNEW System must operate at required availability while adding new software.

3.2.4.2.3 The NNEW software must operate at required availability while adding new metadata.

3.2.4.2.4 The NNEW software must operate at the required availability while adding new users.

3.2.5 Scalability

3.2.5.1 The NNEW System must be expandable to accommodate 50 % increase in the total number of users without system redesign.

3.2.5.2 The NNEW System must be expandable to accommodate TBD% increase in total weather data throughput without system redesign.

3.2.5.3 The NNEW System must be expandable to accommodate 50 % increase in total software resource utilization without system redesign.

3.2.5.4 The NNEW System must be expandable to accommodate an increase of 50% of total hardware resource utilization without redesign.

3.2.5.5 Reserve Capacity

3.2.5.5.1 The NNEW System must contain sufficient processing reserve capacity so that the mean utilization over any 5-minute interval does not exceed 75 percent of the maximum processing capacity.

3.2.5.5.2 The NNEW System must contain sufficient memory reserve capacity so that memory utilization does not exceed 75 percent of the maximum memory capacity.

3.2.5.5.3 The NNEW System must contain sufficient on-line storage reserve capacity so that the storage utilization within the NNEW system does not exceed 50 percent of the maximum on-line storage capacity.

3.2.6 Operational Software

3.2.6.1 TBD (This section may address the use of the NNEW WCS and WFS RI GFE/GFI and constraints on using FAA- licensed database software as applicable).

3.2.6.1.1 Portability

3.2.6.1.2 The NNEW System software must be portable to the extent that porting it to another implementation of the operating system on the same hardware platform must satisfy all functional requirements.

3.2.6.1.3 The NNEW System software must be portable to the extent that porting it to another implementation of the operating system on the same hardware platform must satisfy all performance requirements.

3.2.6.1.4 The NNEW System software must be portable to the extent that 98% of the code must be portable without change when porting it to another implementation of the operating system.

3.2.7 Operational Hardware

3.2.7.1 The NNEW System must utilize Commercial Off-the-Shelf hardware.

4 PHYSICAL INTEGRATION

The NNEW equipment will be deployed at the chosen FAA facilities. Installation will comply with all Federal and local codes to meet safety, electrical, and environmental concerns. Site surveys will be conducted to by the NNEW Program and primary contractor to assess the installation location at each facility.

4.1 Real Property

Procurement of additional government real estate is not planned or necessary for NNEW. The physical space needed to accommodate systems, auxiliary equipment, and personnel both for end-state operations and during transition to the new capability is based on the alternative selection at IID.

4.1.1 The NNEW System must be located in NAS facilities.

4.1.2 The NNEW equipment racks and associated peripherals must be installed in accordance with National Fire Protection Association (NFPA) NFPA 5000, Building Construction and Safety Code™ clearance standards.

4.2 RESERVED

4.3 Environmental

4.3.1 The NNEW Program's equipment installation and operation must be in accordance with the National Environmental Policy Act (NEPA) and FAA Order 1050.1E, Environmental Impacts: Policies and Procedures.

4.3.2 NNEW Program's prevention, control and abatement procedures must be in accordance with FAA Order 1050.10, Prevention, Control and Abatement of Environmental Pollution at FAA Facilities.

4.3.3 The NNEW Program's acquisition, recycling and waste prevention procedures must be in accordance with Executive Order (EO) 12088, Federal Compliance with Pollution Control Standards, and EO 12873, Federal Acquisition, Recycling, and Waste Prevention.

4.3.4 The NNEW Program's environmental protection procedures must conform to

Title 40 Code of Federal Regulations (CFR), Environmental Protection.

4.4 Energy Conservation

4.4.1 The NNEW Program will consider energy efficiency in program planning activities and equipment selection, in accordance with Energy Independence and Security Act of 2007 (EISA) and the Energy Policy Act of 2005 (EPACT).

4.4.2 The NNEW System must meet energy conservation requirements in accordance with Executive Order 13423, Strengthening Federal Environmental, Energy, and Transportation Management.

4.4.3 The NNEW Program must meet energy conservation requirements in accordance with Executive Order 13514, Federal Leadership in Environmental, Energy, and Economic Performance.

4.4.4 The NNEW Program must meet energy conservation requirements in accordance with and FAA Order 1053.1A, Energy and Water Management Program for FAA Buildings and Facilities.

4.5 Heating, Ventilation, Air Conditioning

4.5.1 The operating NNEW equipment must conform to operating limits, as specified by supplying vender, without requiring special cooling equipment other then forced-air with the NNEW enclosures.

4.6 Grounding, Bonding, Shielding, and Lightning Protection

4.6.1 The NNEW System must be protected in accordance with facility grounding, bonding, shielding, and lightning protection requirements.

4.6.2 The NNEW System equipment must protected in accordance with FAA-STD-019E, Lightning Protection, Grounding, Bonding, and Shielding for Facilities.

4.6.3 The NNEW System equipment must protected in accordance with FAA-STD-020B, Transient Protection Grounding, Bonding, and Shielding Requirements for Equipment.

4.6.4 The NNEW System equipment must be protected in accordance with American

National Standards Institute (ANSI)/Institute of Electrical and Electronics Engineers (IEEE) 1100-1992, Powering and Grounding Sensitive Electronic Equipment.

4.6.5 The NNEW System equipment must be protected in accordance with NFPA Standard 70, National Electric Code®*;* and local codes.

4.7 Cables

4.7.1 The NNEW System cable installation plans and installation must be approved by the FAA and documented for inclusion in facility drawing records.

4.7.2 The NNEW System cable installation plans and installation must meet the requirements of FAA Order 6630.4A, En Route Communications Installation Standards Handbook.

4.7.3 The NNEW System must utilize plenum-rated cables installed between walls, under structural floors, and above dropped ceilings.

4.8 Hazardous Materials

4.8.1 The NNEW System equipment must be free of asbestos, lead (except for lead-acid batteries, and lead-based solder on circuit boards if no acceptable substitute is available), and mercury (except that mercury in traces will be allowed in LCD Monitors).

4.8.2 NNEW Program's Reutilization and Disposition Plan must identify handling, storage, and disposal requirements for any hazardous materials in the equipment, in accordance with the *Resource Conservation and Recovery Act (RCRA)* and FAA Order 4600.27, Personal Property Management.

4.8.3 Personnel must be protected from asbestos hazards during renovation and demolition activities, in accordance with FAA Order 1050.20A, Airway Facilities Asbestos Control Program.

4.8.4 Facilities requiring modification for NNEW installation (e.g., drilling holes in walls, flooring, or fire barriers, removing floor tiles) must be inspected for asbestos in the area to be disturbed prior to modification. (If asbestos is identified

in an inspection, an action plan for removal must be developed and implemented before NNEW installation, in accordance with FAA Order 1050.20A, Airway Facilities Asbestos Control Program.)

4.8.5 The NNEW Program must perform product construction and renovation practices protected in accordance with 29 CFR 1910.1001, Asbestos.

4.8.6 The NNEW Program must furnish the Material Safety Data Sheets (MSDS) for hazardous components prior to delivery of the first NNEW installation, in accordance with 29 CFR 1910.1200, Hazard Communication.

4.9 Power Systems and Commercial Power

The NNEW Program is responsible for the modification or upgrade of FAA facilities power systems to include power panels, switching devices, and other power system components required to accommodate the NNEW System on the FAA facilities critical power bus. Site Surveys will be conducted to determine electrical availability at each site.

4.9.1 Electrical implementation

4.9.1.1 The installed NNEW equipment at all FAA NAS Facilities must comply with the electrical power requirements in accordance with FAA-G-2100H, *Electronic Equipment, General Requirements*.

4.9.2 Convenience receptacles

4.9.2.1 The convenience receptacles must not be connected to the FAA Facilities critical power bus.

4.10 Telecommunications

4.10.1 The NNEW telecommunications requirements must be identified and acquired in accordance with FAA Order 4441.16, *Acquisition of Telecommunications Systems, Equipment, and Services.*

4.10.2 The NNEW System telecommunications requirements must be incorporated in the Future FAA Telecommunications Program Plan to facilitate telecommunications services and budget planning.

4.11 Special Considerations

4.11.1 Seismic Safety

4.11.1.1 To ensure the safety of personnel during a seismic event, the NNEW equipment must meet the requirements of DOT Specification FAA-G-2100H, *Electronic Equipment, General Requirements*, Personnel Safety and Health.

5 FUNCTIONAL INTEGRATION

This section covers the requirements necessary for integration the NNEW System into the operational environment. Many of the requirements in this section are compliance requirements where the NNEW System will be required to comply with certain NAS, International, or other federal standards governing the way that the System operates.

5.1 Integration with Other FAA Enterprise Architecture Elements

This section contains information about the internal and external systems that will interface to the NNEW System. The interfaces listed have been confirmed and are known to need an interface to the NNEW System at IOC. Additional interfaces, including the ones listed below, can be found listed in a table in Appendix X1.

5.1.1 Non Net-Enabled Weather Consumer Interface Requirements

5.1.1.1 The NNEW System must disseminate weather information to the En Route Automation Modernization (ERAM) located at all NAS Air Route Traffic Control Center (ARTCC) facilities.

5.1.1.2 The NNEW System must disseminate weather information to the Advanced Technologies Oceanic Procedures (ATOP) at the ARTCC facilities located in New York, NY, Oakland, CA, and Anchorage, AK.

5.1.1.3 The NNEW System must disseminate weather information to the Dynamic Ocean Track System (DOTS) located at the Air Traffic Control Systems Command Center (ATCSCC) and the ARTCC facilities located in New York, NY, Oakland, CA, and Anchorage, AK.

5.1.1.4 The NNEW System must disseminate weather information to the Flight Data Processing 2000 (FDP2K) located the ARTCC in Anchorage, AK.

5.1.1.5 The NNEW System must disseminate weather information to the Traffic Flow Management System (TFMS) located at the ATCSCC, all NAS ARTCC facilities, all NAS TRACON facilities, all NAS CERAP facilities, and the HCF.

5.1.1.6 The NNEW System must disseminate weather information to the Time Based Flow

Metering (TBFM) System located at TBD.

5.1.1.7 The NNEW System must disseminate weather information to the Integrated Terminal Weather System (ITWS) located at 35 NAS Terminal Radar Approach Control (TRACON) facilities.

5.1.1.8 The NNEW System must disseminate weather information to the Microprocessor En Route Automated Radar Tracking System (MEARTS) located at the Honolulu Control Facility (HCF), the Combined Enroute Radar Approach (CERAP) facilities located in Guam and San Juan, Puerto Rico, and the ARTCC in Anchorage, AK.

5.1.1.9 The NNEW System must disseminate weather information to the NAS Information Display System (NIDS) located at all NAS TRACON facilities and all NAS ATCT facilities.

5.1.2 Net-Enabled Weather Consumer Interface Requirements

5.1.2.1 The NNEW System shall disseminate weather information to the NextGen Weather Processor (NWP).

5.1.2.2 The NNEW System must disseminate weather information to the Future Flight Service Program System (FFSPS) located at TBD.

5.1.3 Non Net-Enabled Weather Provider Interface Requirements

5.1.3.1 The NNEW System must ingest weather information from the Regional ADAS Service Processor (RASP) located at both NEMC facilities.

5.1.3.2 The NNEW System must ingest weather information from the Integrated Terminal Weather System (ITWS) located at 35 NAS Terminal Radar Approach Control (TRACON) facilities

5.1.4 Net-Enabled Weather Provider Interface Requirements

5.1.4.1 The NNEW System shall ingest weather information from the NWP.

5.1.5 FAA NNEW System Dependencies

5.1.5.1 The NNEW System must utilize the FAA Telecommunications Infrastructure (FTI) for

its physical network.

5.1.5.2 The NNEW System must utilize the FAA Telecommunications Infrastructure (FTI) time source to synchronize time across all NNEW System nodes.

5.1.5.3 The NNEW System must utilize System Wide Information Management (SWIM) System messaging components or infrastructure where available.

5.1.5.4 The NNEW System must interface with NAS Remote Maintenance and Monitoring System (RMMS).

5.1.5.5 The NNEW System must interface with the Event Reconstruction System (ERS). TBD.

5.1.6 NNEW System Interfaces External to the NAS

5.1.6.1 The NNEW System must disseminate weather data to the National Oceanic Atmospheric Administration's (NOAA) 4-Dimensional Weather Data Cube (Cube).

5.1.6.2 The NNEW System must receive data from the NOAA's Cube.

5.1.7 Interface Documentation Requirements

5.1.7.1 The NNEW Program must create a single interface requirements and control document for all interfaces identified in the Sections 5.1. (If unique interface requirements exist for certain legacy or native systems, those will be written into appendices of the main interface requirements or control document.)

5.2 Information/Data Requirements

5.2.1 Information/Data Dissemination Requirements

The product flow worksheet, located in Appendix X, has the quality of service characteristics listed for the known products of the NNEW System.

5.2.2 Information Metadata Requirements

See SV6.

5.2.3 Archiving Data and Data Products

No current weather data archival requirements.

5.2.4 Product Requirements

The product flow worksheet, located in Appendix X, has the quality of service characteristics listed for the known products of the NNEW System.

5.2.5 Existing NAS Data Specifications Requirements

See section 5.3.2 for NAS Data Specifications and standards.

5.3 Software Integration

5.3.1 Technical Software Interface Requirements

No current technical software interface requirements.

5.3.2 NAS Standards of Interoperability/Compliance

5.3.2.1 The NNEW System data must conform to FAA-STD-060b, Data Standard for the National Airspace System (NAS), March 8, 2004.

5.3.2.2 The NNEW System software must exchange standardized data elements Management with automation systems in accordance with FAA Order 1375.1D Data.

5.3.2.3 The NNEW System software and data management must be in accordance with FAA Order 1375.1 D, Data Management, July 25, 2006.

5.3.2.4 The NNEW System software must be developed in accordance with FAA-STD-026A, Software Development for the National Airspace System (NAS), May 1, 2009.

5.3.2.5 The NNEW System data must conform to FAA-STD-063, XML Namespaces, May 1, 2009.

5.3.2.6 The NNEW System information data service registration must conform to FAA-STD-064, Web Service Registration, May 1, 2009.

5.3.2.7 The NNEW System information services must conform to FAA-STD-065, Web Service Description Documents, February 26, 2010.

5.3.2.8 The NNEW System information services must conform to FAA-STD-066, Web Service Taxonomies, February 26, 2010.

5.3.2.9 The NNEW Program's Interface Requirements Documents (IRD)/Interface Control Documents (ICD) must be developed in accordance with FAA-STD-025, Preparation of Interface Control Documents.

5.3.2.10 The NNEW System must meet or exceed the current weather services availability per the National Airspace System Requirements Document, September 2010.

5.3.2.11 The NNEW System must conform to the FAA Information System Security Architecture, Version 5.

5.3.3 Other Government Agencies Standards Compliance

5.3.3.1 The NNEW System metadata must be developed in accordance with the Federal Geographic Data Committee's (FGDC) Content Standard for Digital Geospatial Metadata (CSDGM), Version 2 (FGDC-STD-001-1998).

5.3.4 Computer Resource Constraints

5.3.4.1 Unless otherwise specified, The NNEW System must be developed using open-system standards programming languages that are platform independent.

5.3.5 Unique User Interface Requirements

There are currently no unique user interface requirements.

5.4 Spectrum Management

[Not required]

5.5 Standardization

5.5.1 Standardized NAS Products

5.5.1.1 The NNEW System must be developed utilizing SWIM standardized government furnished equipment.

5.5.1.2 The NNEW System must be developed utilizing any available NAS Enterprise Licensed COTS products.

5.5.2 International Standards Compliance

5.5.2.1 The NNEW System must be developed in compliance with the following international standards:

a) ISO 19101.2002 Geographic Information - Reference Model
b) ISO 19103.2005 Geographic Information - Conceptual Schema Language
c) ISO 19107.2003 Geographic Information - Spatial Schema
d) ISO 19108.2002 Geographic Information - Temporal Schema
e) ISO 19108.2006 Geographic Information - Temporal Schema - Corrigendum 1
f) ISO 19109.2005 Geographic Information - Rules for Application Schema
g) ISO 19110.2005 Geographic Information - Methodology for Feature Cataloging
h) ISO 19111.2007 Geographic Information - Spatial Referencing by Coordinates
i) ISO 19115.2003 Geographic Information - Metadata
j) ISO 19115.2006 Geographic Information - Metadata - Corrigendum 1
k) ISO 19118.2005 Geographic Information - Encoding
l) ISO 19119.2005 Geographic Information - Services
m) ISO 19121.2000 Geographic Information - Imagery and gridded data
n) ISO 19123.2005 Geographic Information - Schema for coverage geometry and functions
o) ISO 19127.2005 Geographic Information - Geodetic codes and Parameters
p) ISO 19136 Geography Markup Language (GML)
q) ISO 19139.2007 Geographic Information - Metadata - XML Schema Implementation
r) ISO 8601.2004 Data Elements and Interchange Format – Representation of Dates and Times
s) ISO/IEC JTC1 SC32 N1105: Information technology — Metadata Interoperability and Bindings (MDIB) Part 002: Common vocabulary: 2004-04-12
t) ISO/IEC 11179, Information Technology – Metadata Registries (MDR), Parts 1 – 6
u) ISO/IEC 12207:1995 Information technology -- Software life cycle processes

5.5.3 Standard Recommendations, Notes, White Papers, and Other.

5.5.3.1 The NNEW System must be developed in compliance with the following specification/standards notes, white papers, and other recommendations.

a) Web Services Description Language (WSDL) 1.1 W3C Note 15 March 2001
b) Web Services Description Language (WSDL) Version 2.0 W3C Recommendation
c) Web Services Architecture, W3C Working Group Note 11 February 2004
d) Web Service Description Requirements, W3C Working Draft, J. Schlimmer, 28
e) Web Service Semantics - WSDL-S W3C Member Submission 7 November 2005
f) XML Information Set (Second Edition) W3C Recommendation 4 February 2004
g) OGC Web Feb Feature Service (WFS) Implementation Standard
h) OGC WFS Schemas 2.0.0
i) OASIS Reference Model for Service Oriented Architecture 1.0, 12 October 2006
j) OASIS Web Services Notification (WSN) Base Notification 1.3
k) IETF RFC 3986 Uniform Resource Identifier (URI): Generic Syntax, Network Working Group, January 2005

5.5.4 Technical Standards Framework

The NNEW Technical Framework has been developed to be in-line with the SWIM System's Technical Framework as depicted in the SWIM Segment 1 Technical Overview document. In fact, the NNEW Program has extended the SWIM technical framework to include weather

specific standards to allow for more effective dissemination of weather information. The NNEW Technical Framework is depicted in Figure 4.

There are some standards depicted in the framework below that are currently not required for the implementation of the NNEW System. These standards may have some value for implementation of future NNEW System requirements and therefore have been depicted in the figure as potential/future standards.

5.5.4.1 The NNEW System must conform to the following Geospatial Service standards:

a) The NNEW System must be developed utilizing the Open Geospatial Consortium (OGC) Web Coverage Service (WCS) Version 1.1.2
b) Open Geospatial Consortium, (OGC) Web Feature Service (WFS) Version 2.0
c) Open Geospatial Consortium, (OGC) Catalog Service (CS/W) Version 2.0.2
d) Open Geospatial Consortium, (OGC) Sensor Model Language (SensorML) Version 1.0
e) OpenGIS Web Services (OWS) Common Version 1.1.0

5.5.4.2 The NNEW System must conform to the following Enterprise Service Management standards:

a) Java Management Extensions (JMX), Version 1.2
b) Simple Network Management Protocol, Version 3.0

5.5.4.3 The NNEW System must conform to the following Quality of Service – Security standards.

a) Security Assertion Markup Language (SAML), Version 2.0
b) eXtensible Access Control Markup Language (XACML), Version 2.0
c) Web Services-Security, (WS-Security), Version 1.1
d) XML Signature, Version 1.1

5.5.4.4 The NNEW System must conform to the following Interface Management standards:

a) ebXML Registry Information Model (RIM) Version 3.0.1
b) ebXML Registry Services (RS) and Protocols Version 3.0.1
c) Web Services Description Language (WSDL) Version 2.0 Part 2: Message Exchange Patterns W3C Working Draft 26 March 2004
d) Web Ontology Language (OWL), Version 2
e) Resource Description Framework (RDF)

5.5.4.5 The NNEW System must conform to the following Data Representation standards:

a) Gridded Binary Edition 2 (GRIB 2)
b) Network Common Data Form (NetCDF), Version 4.0

c) Weather Information Exchange Model/Schema (WXXM/WXXS), Version 1.1
d) Geographic Markup Language (GML), Version 3.2
e) ISO 8601.2004 Data elements and interchange formats - Representation of dates and times
f) Extensible Markup Language (XML) 1.0 (Fourth Edition), W3C Recommendation 16 August, 2006, edited in place 29 September, 2006
g) World Wide Web Consortium (W3C) XML Schema
h) XML Path Language (XPath), Version 2.0
i) XML Query Language (XQuery), Version 1.0
j) XSL Transformations (XSLT), Version 2.0
k) Efficient XML Interchange (EXI), Format 1.0

5.5.4.6 The NNEW System must conform to the following Messaging standards:

a) W3C Simple Object Access Protocol (SOAP)
b) Web Services Notification (WS-Notification)
c) SOAP Message Transmission Optimization Mechanism
d) SOAP Messages with Attachments
e) Web Services Addressing (WS-Addressing), Version 1.0

5.5.4.7 The NNEW System must conform to the follow Transport standards:

a) Hypertext Transfer Protocol – HTTP/1.1
b) Java Messaging Service (JMS), Version 1.1
c) File Transfer Protocol (FTP), RFC 959, October 1985

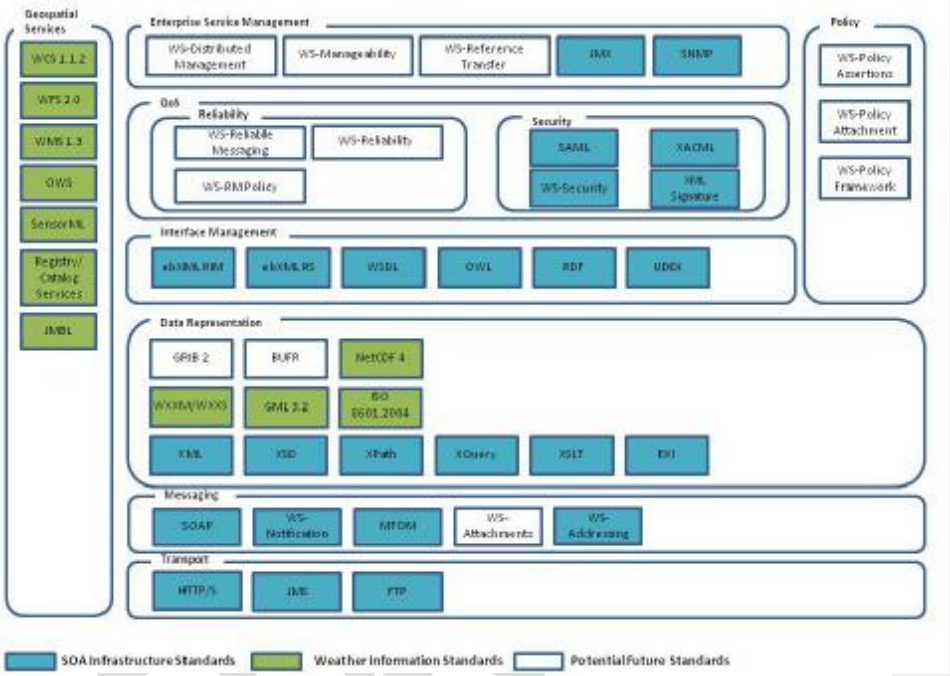

Figure 4: NNEW Technical Framework

6 Human Integration

A design goal for the NNEW System is to use human-centered design processes that provide acceptable user interfaces that are quickly understood, easy to use and efficient to maintain. The NNEW Program will require skills and staffing capabilities focused on technical and administrative users such as System Administrators, Program Technical Support Operators, Researchers, System Developers, and Maintenance Technicians. The skills and capabilities required of these users will include maintaining system configuration files, updating the NNEW System Registry, monitoring performance, developing software patches, testing future capabilities, maintaining subscriptions, diagnosing faults, and removing and replacing components to the lowest repairable unit.

6.1 Human Systems Engineering

6.1.1 The NNEW Program must address human factors in all disciplines in accordance with FAA Order 9550.8 Human Factors Policy. (The goal is to use human-centered design processes that will result in efficient, effective, user-acceptable system interfaces that will be simple to train, use, and maintain.)

6.1.2 The NNEW Program must develop a Human Factors Program Plan in accordance with the FAA Human Factors Job Aid. (The FAA Human Factors Job Aid is a guide to the development and conduct of the FAA Program Office/ IPT Human Factors Program for system development.)

6.1.3 The NNEW Program must require that the NNEW System development Contractor conduct a Human Factors Engineering Program in accordance with MIL-HDBK-46855A, Human Engineering Program Process and Procedures, Program Tasks and HE Procedures for Contractors.

6.1.4 The NNEW Program must perform a task analyses in accordance with MIL-HDBK-46855A, Human Engineering Program Process and Procedures, HE Methods and Tools.

6.1.5 The NNEW Program must perform acquisition in accordance with DOT/FAA/CT-03/05 HF-STD-001 Human Factors Design Standard (HFDS) for Acquisition of Commercial-Off-the-Shelf Subsystems, Non-Developmental

Items, and Developmental Systems.

6.1.6 The NNEW System's human-to-system interfaces must be designed in accordance with human-centered design processes described in the FAA Human Factors Awareness tool, "Usability" section at the FAA Human Factors Home Page and ISO 13407 (Feb 96): "Human-centered design processes for interactive systems.

6.1.7 The NNEW System's human-system integration design must be in accordance with the HFDS.

6.1.8 The NNEW System's human-to-system interfaces must be designed in accordance with the HFDS, Section 2.4 Standardization.

6.1.9 The NNEW System's human-to-system interfaces must be designed in accordance with the HFDS, Chapter 2 General design requirements.

6.1.10 The NNEW System's human-to-system interfaces must be designed for simplicity of use in compliance with the HFDS, Section 2.2 Simplicity.

6.1.11 The NNEW System's human-to-system interfaces must human error tolerant, in accordance with the HFDS, Section 2.5.4 Make systems error tolerant.

6.1.12 The NNEW System's human-to-system interfaces must be designed for ease of handling infrequent, critical situations and emergencies in accordance with the HFDS, Section 2.5.7 Provide emergency procedures for critical systems.

6.1.13 The NNEW System's function assignment to humans (users) must comply with the HFDS revised Section 3.11 Function allocation/levels of automation.

6.1.14 The NNEW System's human-to-system interfaces must be designed in accordance with the HFDS, Chapter 3 Automation.

6.1.15 The NNEW System's human-to-system interface must be analyzed for system safety and personnel safety hazards in accordance with ASD-100-SSE-1, NAS Modernization System Safety Management Program.

6.1.16 The NNEW System's human-to-system interface must be human error resistant in accordance with the HFDS, Section 2.5.3 Make Systems Error Resistant.

6.1.17 The NNEW System's displays and attendant commands and controls must be compatible with human perceptual and cognitive capabilities and limitations in compliance with the HFDS, Section 3.4 Interface.

6.1.18 The NNEW System must meet situational awareness requirements in accordance with the HFDS, Section 3.12 Information automation.

6.1.19 The NNEW System must enable personnel communication and information interchange in accordance with the HFDS, Section 3.2.3 Consider effects on coordination.

6.1.20 The NNEW System must provide indications when automated functions are enabled and/or disabled in accordance with the HFDS, Section 3.3 System response and feedback and 3.6 Modes.

6.1.21 The NNEW System's interfaces must be designed to enable efficient, accurate use during degraded modes (when one or more functions are disabled) in accordance with the HFDS, Section 3.6.6 Provide consistent features and functions.

6.1.22 The NNEW System's automated diagnostics aids must enable fault management and system failure recovery through timely user notification of specific failures or potential failures in accordance with the HFDS, Section 3.8 Fault Management.

6.1.23 The NNEW System's computer-to-human interfaces must be designed in accordance with the HFDS, Chapter 8 Computer human interface as applicable to the tasks identified for maintenance, monitoring, and system administration.

6.1.24 The NNEW System's screen designs must be designed in accordance with the HFDS, Section 8.1 Screen Design.

6.1.25 The NNEW System's visual coding must be designed in accordance with the HFDS, Section 8.6 Coding.

6.1.26 The NNEW System's color-coding must be designed in accordance with the HFDS, Section 8.6 Coding and Section 8.6.2 Color.

6.1.27 The NNEW System must be designed in accordance with the HFDS, Chapter 6, Controls and visual indicators.

6.1.28 The NNEW System's alarms and alerts must be designed in accordance with the HFDS, Chapter 7 Alarms, audio, and voice communications.

6.1.29 The NNEW System's user-to-system interactions must be designed in accordance with the HDFS, Section 8.7 Interaction and 8.8 General interactive techniques.

6.1.30 The NNEW System's human-to-system interfaces must be designed in accordance with the HFDS, Section 8.15 System operations.

6.1.31 The NNEW System must provide a response to a system administration command in accordance with the HFDS, Section 8.15.6 System response time.

6.1.32 The NNEW System must provide on-line help (i.e., procedural aids, the ability to recover from errors, and advice without requiring a user to exit from the application) in with the HFDS, Section 8.16.1 On-line help.

6.1.33 The NNEW System must provide on-line help that is context sensitive to administrative and maintenance tasks in accordance with the HFDS, Section 8.16.4.

6.1.34 The NNEW System's workstations must be designed in accordance with the HFDS, Chapter 10 Workplace design and the 2006 amendment.

6.1.35 The NNEW System's displays must be selected in accordance with the HFDS, Chapter 5 Displays and printers.

6.1.36 The NNEW System's displays must be readable from the position from which they will be used in accordance with the HFDS, Section 5.1.2 Location and arrangement.

6.1.37 The NNEW System's input devices must be designed in accordance with HFDS, Chapter 9 Input devices.

6.1.38 The NNEW System's maintainer-to-system interfaces must be designed in accordance with the HFDS, Chapter 4 Designing equipment for maintenance.

6.1.39 The NNEW System's System equipment must be labeled in accordance with HFDS, Section 4.3.5 Labeling and Marking.

6.1.40 The NNEW System's user documentation must be published in accordance with the HFDS, Chapter 15 User documentation.

6.1.41 The NNEW System's technical manuals must be documented in accordance with the HFDS, Chapter 15 User documentation.

6.1.42 The NNEW System's human-to-system physical interfaces must be designed in accordance with the HFDS, Chapter 14 Anthropometry and biomechanics.

6.1.43 The NNEW System's maintainer physical and visual access must be must be designed in accordance with the HFDS, Section 4.3.4.1 Physical Accessibility.

6.1.44 The NNEW System's Lowest (Line) Replaceable Units must be accessible and removable at the equipment's operational location in accordance with the HFDS, Section 4.3.4 Positioning equipment.

6.1.45 The NNEW System's critical equipment and documentation must be accessible in accordance with the HFDS, Section 4.3.4.2 Relative accessibility.

6.1.46 The NNEW System's high failure-rate items must be accessible in accordance with the HFDS, Section 4.3.4.2 Relative accessibility.

6.1.47 The NNEW System's components must be mounted in accordance with the HFDS, Section 4.3.3 Mounting in drawers, on racks, and on hinges.

6.1.48 The NNEW System's working environment(s) must be designed in accordance with the HFDS, Chapter 13 Environment.

6.1.49 The NNEW System's ventilation must be in accordance with the HFDS, Section 13.2 Ventilation and Section 13.3 Temperature and Humidity.

6.1.50 The NNEW System's working environment must be illuminated in accordance with the HFDS, Section 13.4 Illumination.

6.2 Employee Safety and Health

6.2.1 General Employee Occupational Safety and Health (EOSH) Requirements

6.2.1.1 The NNEW Program design, including all commercial off-the-shelf (COTS) equipment, must be in accordance with personnel safety requirements as defined in a-h, as follows:

a) 29 CFR 1910, Occupational Safety and Health Standards (General Industry)
b) 29 CFR 1926, Safety and Health Regulations for Construction.
c) National Fire Protection Association (NFPA) 70, National Electric Code
d) NFPA 70E, Standard for Electrical Safety in the Workplace
e) FAA Order 3900.19B, FAA Occupational Safety and Health Program
f) FAA Standard HF-STD-001, Human Factors Design Standard
g) Nationally Recognized Testing Laboratories of 29 CFR 1910 subpart S, section (3)
h) Pre-Construction and Maintenance Project Safety and Health Checklist, Form 3900-8 (see Appendix A, FAA Order 3900.57).

6.2.1.2 EOSH Safety Requirements

6.2.1.2.1 The NNEW Program must conduct site surveys prior to installation of new NNEW Program equipment, and provide the results to EOSH Services (AJW-23) for review.

6.2.1.2.2 The NNEW Program must develop an action plan to mitigate impacts identified in the site survey in accordance with relevant EOSH requirements.

6.2.1.2.3 The NNEW Program must ensure that an EOSH System Hazard Analysis (ESHA) is coordinated by the Program's Contracting Officer's Technical Representative (COTR), and conducted by EOSH Services (AJW-23) at the Program's key implementation site prior to Contract Acceptance Inspection (CAI).

6.2.1.2.4 The NNEW Program must develop a Hazard Abatement Plan. (Plan for addressing all identified EOSH hazards, upon receipt of the ESHA detailed findings report from EOSH Services.)

6.2.1.2.5 The NNEW Program must coordinate with EOSH Services (AJW-23) during the In-Service Decision process. (Used to approve close-out of individual In-Service Review (ISR) checklist items pertaining to EOSH issues.

6.2.1.2.6 The NNEW Program must coordinate with the Facilities' EOSH Point of Contact (POC). (To address issues affecting the existing Occupant Emergency Plan (OEP) (e.g., egress routes, fire life safety) during

implementation.)

6.2.1.3 The NNEW Program must develop a Generic Site Implementation Plan (GSIP) in accordance with FAA Order 6000.50C, Technical Operations National Airspace System (NAS) Integrated Risk Management.

6.2.1.4 The NNEW Program must coordinate review of the GSIP with EOSH Services to ensure that EOSH requirements are appropriately addressed prior to the installation of the first system (i.e., Key Site).

6.2.1.5 The NNEW Program must obtain required permits to support Program activities, in accordance with a-b, as follows:

a) FAA Order 3900.57A, FAA Pre-Construction and Maintenance Project Safety and Health Checklist for Construction and Demolition Permits
b) Clean Air Act and 40 CFR 61, Sections 61.140-61.157 for Asbestos National Emission Standards for Hazardous Air Pollutants (NESHAP) Permits

6.2.2 Safety Hazard Labeling Requirements

6.2.2.1 The NNEW Program's equipment that presents a potential safety hazard to personnel must be marked with appropriate warning labels or placards, in accordance with a-d, as follows:

a) 29 CFR 1910.145, Specifications for Accident Prevention Signs and Tags
b) FAA HF-STD-001, Human Factors Design Standard, Chapter 12.16, Safety Labels and Placards, for marking line replaceable units (LRUs) exceeding 30 pounds
c) American National Standards Institute (ANSI) Z535.4, Product Safety Signs and Labels
d) FAA-G-2100H, Chapter 3.3.5.5, Markings, Signs, Tags and Symbols, for marking electrical equipment

6.2.3 Electrical Safety Requirements

6.2.3.1 The NNEW Program must adhere to electrical safety requirements in accordance with a-e, as follows:

a) 29 CFR 1910, Subpart S, Electrical
b) DOT Specification FAA-G-2100H, Electronic Equipment, General Requirements
c) National Fire Protection Association (NFPA) 70, National Electrical Code
d) NFPA 70E, Electrical Safety in the Workplace
e) FAA Order 6950.27, Short Circuit Analysis and Protective Device Coordination Study, if NNEW equipment requires a modification to existing power distribution
f) 29 CFR 1910.303 to satisfy the minimum clear working space requirements.

6.2.4 Lockout/Tag-out Requirements

6.2.4.1 The NNEW Program must implement lockout/tag-out (LOTO) procedures, including de-energization verification, to control hazardous energy during installation, servicing, modification, and maintenance of Program equipment in accordance with 29 CFR 1910.147 and FAA Order 3900.19B, Chapter 13.

6.2.5 Battery Requirements

6.2.5.1 The NNEW Program must ensure that backup batteries used in the program equipment package are handled in accordance with a-d, as follows:

a) FAA Order 3900.19B, FAA Occupational Safety and Health Program
b) FAA Order 6980.25C, Maintenance of Batteries for Standby Power
c) 29 CFR 1926.441, Batteries and Battery Charging
d) National Fire Protection Association (NFPA) 70, National Electrical Code®, Article 480

6.2.6 Emergency Eyewashes/Showers

6.2.6.1 The NNEW Program must provide emergency eyewash and shower equipment for immediate emergency use in any work area where the eyes or body of any person may be exposed to injurious corrosive materials, in accordance with a-c, as follows:

a) 29 CFR 1910.151, Medical Services and First Aid
b) FAA Order 6980.25C, Maintenance of Batteries for Standby Power
c) ANSI Z358.1, American National Standard for Emergency Eye Wash and Shower Equipment

6.2.7 Material Handling

6.2.7.1 The NNEW Program's material handling equipment must be in accordance with a-d, as follows:

a) FAA Order 3900.19B, FAA Occupational Safety and Health Program
b) FAA Standard HF-STD-001, Human Factors Design Standard. Section 4.2, Designing Equipment for Handling
c) 29 CFR 1910, Occupational Safety and Health Standards (General Industry), Subpart N, Materials Handling and Storage
d) 29 CFR 1910.22 to ensure that equipment does not exceed floor loading limits in FAA buildings or structures where the equipment will be installed, transported or stored

6.2.8 Occupational Noise

6.2.8.1 The NNEW Program must comply with occupational noise requirements in accordance

with a-c, as follows:

a) FAA Order 3900.19B, FAA Occupational Safety and Health Program
b) FAA Standard HF-STD-001, Human Factors Design Standard, Section 13.5.2 Noise
c) 29 CFR 1910.95, Occupational Noise Exposure

6.2.9 Indoor Air Quality (IAQ)

6.2.9.1 The NNEW Program must not adversely impact indoor air quality (IAQ) at FAA facilities, in accordance with a-b, as follows:

a) FAA Order 3900.19B, FAA Occupational Safety and Health Program
b) U.S. Environmental Protection Agency (EPA) primary and secondary standards

6.2.10 Personal Protective Equipment

6.2.10.1 The NNEW Program must evaluate NNEW System installations by conducting a Job Hazard Analysis (JHA) in accordance with a-b, as follows:

a) FAA Order 3900.19B, FAA Occupational Safety and Health Program, Chapter23 and 25
b) 29 CFR 1910, Subpart I, Personal Protective Equipment

6.2.11 Non-FAA Facilities

6.2.11.1 The NNEW Program must ensure that NNEW equipment maintained by FAA Personnel at non-FAA-owned facilities are maintained in accordance with a-e, as follows:

a) 29 CFR 1910, Occupational Safety and Health Standards (General Industry)
b) 29 CFR 1926, Safety and Health Regulations for Construction
c) FAA Order 3900.19B, FAA Occupational and Health Program
d) FAA Standard HF-STD-001, Human Factors Design Standard)
e) National Fire Protection Association (NFPA) 70, National Electrical Code, and NFPA 70E, Electrical Safety in the Workplace

6.3 Specialized Skills and Capabilities

The NNEW System task analyses *must* be in accordance with MIL-HDBK-46855A, Human Engineering Program Process and Procedures, Section 8 "HE Methods and Tools."

6.3.1 Workload

6.3.1.1 The NNEW System's operator and maintainer cognitive and physical workloads must be in accordance with the HFDS, Section 3.1.11 Avoid extreme workload levels and Section 3.1.10 Avoid increasing demands for cognitive resources.

6.3.2 Staffing

6.3.2.1 The NNEW System's staffing levels must be in accordance with a personnel staffing analysis.

6.3.3 Training

6.3.3.1 The NNEW System training must be in accordance with the HFDS, Section 3.10, Training.

6.4 Accessibility Compliance

6.4.1 The NNEW System accessibility must be in accordance with FED-STD-795, Uniform Federal Accessibility Standard (UFAS).

6.4.2 Electronics and Information Technology Accessibility

6.4.2.1 The NNEW System's routine administrative and business applications must be in accordance with 36 CFR 1194, Electronics and Information Technology Accessibility Standard, which implements Section 508 of the Rehabilitation Act of 1973, as amended (29CFR 794d).

7 Security

7.1 Physical Security

7.1.1 The NNEW Program must comply with FAA Order 1600.6C, Physical Security Management Order.

7.1.2 The NNEW Program must comply with FAA Order 1600.6E, Facility Security Policy.

7.1.3 The NNEW Program must comply with FAA Order 1600.69A, Facility Security Management Program.

7.1.4 The NNEW Program must implement a physical environmental protection program.

7.1.5 The NNEW Program *must* comply with FAA Order 6950.2D, Electrical Power Policy Implementation at National Airspace System Facilities, that corresponds to the service from the NAS facility.

7.1.6 The NNEW Program *must* comply with FAA Order 6030.20F, Electrical Power Policy and provide electrical power to the NNEW system.

7.2 Information Security

7.2.1 The NNEW Program must comply with FAA Order 1370.82A, Information Systems Security Program.

7.2.2 The NNEW Program must comply with FAA Order 1370.104, Digital Signature Policy.

7.2.3 The NNEW Program must comply with FAA Order 1370.95, Wide Area Network Connectivity Security.

7.2.4 The NNEW Program must comply with FAA Order 1370.44, Use of FAA Telecommunications Infrastructure (FTI) Services in the National Airspace System (NAS).

7.2.5 The NNEW Program must implement documented training based upon risk

analysis, threat, and vulnerability assessments, on a scheduled Annual Security Assessment and a scheduled three year Security Authorization, in accordance to NIST 800-53 revision 3.

7.3 Personnel Security

7.3.1 The NNEW Program must comply with FAA Order 1600.1E, Human Resources and ASH Policy, to protect all user assets and personnel. (The execution of this policy is the responsibility of the FAA's Human Resources Office and ASH. The Personnel Security Program provides a basis for security determinations for sensitive positions, clearances for access to classified material, and suitability for Federal employment. All FAA personnel are vetted by the Office of Personnel Management (OPM) before being hired.)

7.3.2 All contractors must receive background checks based on OPM's Form 85P "Questionnaire for Public Trust Positions." (ASH's Contractor & Industrial Security Program focuses on security for contractors working at FAA. Program objectives include:

7.3.3 Providing the basis for contractors' clearances

7.3.4 Determining contractors' suitability for employment in the agency with access to FAA resources, facilities, and sensitive information

7.3.5 Safeguarding classified material in the possession of FAA contractors)

8 In-Service Support

8.1 Integrated Logistics Support (ILS)

8.1.1 ILS processes will be applied throughout all of the NNEW system life cycle phases to ensure that logistic support requirements are uniformly identified, acquired, allocated, controlled and maintained.

8.1.2 An Federal Aviation Administration (FAA) Integrated Logistic Support (ILS) program must be established for the NNEW program in accordance with current Acquisition Management System (AMS) policy and Integrated Logistics Support Process Manual (ILSPM), Volume 4, dated August, 2010.

8.1.3 An FAA Integrated Logistic Support Management team (ILSMT) must be formed to develop ILS acquisition and maintenance planning documents for all phases of system lifecycle support. (The ILSMT will consist of Logistic Element Managers (LEMs) who are FAA ILS subject matter experts who will develop the Integrated Logistic Support Plan (ILSP) for NNEW.)

8.2 Staffing

8.2.1 Support staffing for the NNEW System must be in accordance with FAA Acquisition Management System Policy, and FAA Order 1380.40C Airway Facilities Sector Level Staffing Standards System. (This order provides the basis for human resource allocation in the area of Tech Ops, and establishes policy and procedures applicable in the planning, programming and budgeting process using the staffing standard data.)

8.2.2 Support staffing for the NNEW system must be in accordance with staffing plans put into place by the NNEW implementing programs.

8.2.3 The operation and maintenance of the NNEW system must not increase staffing requirements over and above the present NAS staffing at sites, second level engineering activities and the depot.

8.3 Supply Support

8.3.1 NNEW logistics supply support must be in accordance with the Integrated

Logistics Support Plan established by the implementing programs.

8.3.2 Spare and repair parts support, including all required documentation for cataloging, must be provided for both Site and Depot level maintenance. (Final determination of the range and depth of this sparing and parts support will be determined by the ILS provisioning conferences and the Program Office.)

8.4 Support Equipment

8.4.1 The Contractor must identify all required support and test equipment for all NNEW hardware and software. (Where possible, existing site support equipment will be utilized by NNEW.)

8.4.2 As part of the NNEW program the Contractor must provide all equipment and software utilized in the development, test, configuration management, and in-depth troubleshooting for the NNEW software, firmware, and hardware.

8.4.3 The Contractor must provide all tools and equipment required for the NNEW System operation and maintenance in accordance with FAA Order 6200.4G, National Test Equipment Program Management, and FAA Order 4250.9B, Field Material Management and Control.

8.4.4 The Contractor must provide (with prior approval of the FAA) all specialized support and test equipment developed or procured to support the NNEW site or depot level maintenance.

8.5 Technical Data

8.5.1 Technical data requirements will be consistent with the NNEW operations and maintenance concepts and integrated with the other logistics elements.

8.5.2 The NNEW Contractor must use Original Equipment Manufacturer (OEM) maintenance documentation comprised of COTS manuals and instruction books, when available. (These COTS publications will be used to install, operate, configure and maintain the hardware and software.)

8.5.3 NNEW System manuals and technical instructions must be provided in accordance with FAA-D-2494, Technical Instruction Book Manuscripts:

Electronic, Electrical, and Mechanical Equipment, Requirements for Preparation of Manuscript and Production of Books.

8.5.4 Technical Instruction Books (TIBs), if required, must be approved and baselined through the NNEW CM process prior to NNEW delivery to the field, for any NNEW Core Capabilities products provided to the implementing programs.

8.6 System Administration

8.6.1 The NNEW Program must develop a secure administrative interface to allow the NNEW System administrators to perform all NNEW administrative functions.

8.6.2 The NNEW System administrator must install software builds and system adaptation (i.e., 56 day updates).

8.6.3 The NNEW System administrator must switch between two versions of the software.

8.6.4 The NNEW System administrator must perform system shutdown.

8.6.5 The NNEW System administrator must add, delete and modify user accounts.

8.6.6 The NNEW System administrator must perform the following housekeeping functions under user control:

8.6.7 Write files to mass storage

8.6.8 Read files from mass storage

8.6.9 Move files between devices/directories

8.6.10 Access for display/print archived data files

8.6.11 Create and rename user files/user directories

8.6.12 Manage Registry/Repository and Reference Implementation application versions with associated support files in storage. (TypicallyTypically an approved version and version under evaluation)

9 Test and Evaluation

9.1 Critical Operational Issues

Critical Operational (COIs) are key operational effectiveness or operational suitability issues that must be examined in operational testing to determine a product's capability to perform its mission. COIs are broken down to Measure of Effectiveness (MOE) or Measure of Suitability (MOS) statements. These statements address the operational effectiveness or operational suitability of the system. Operational effectiveness addresses the degree to which a product accomplishes its mission when used by representative personnel in the expected operational environment. Operational suitability addresses the degree to which a product intended for field use satisfies its availability, compatibility, transportability, maintainability, safety, human factors, logistics, supportability, documentation, and personnel training requirements.

9.1.1 NNEW

COI 1 Will the NNEW System is able to centrally manage weather information that is accessed through a "virtual database" capability?

- During System Integration Test and Operational Testing (OT) the net-enabled, source agnostic, discovery and delivery of weather information will verify that NNEW System enables access to the virtual weather database.

COI 2 Will NNEW address the "weather dissemination" needs to support weather related decisions in support of air traffic decision makers?

- During OT, the weather data will be sent to the TMUs to be used to support air traffic decisions.

COI 3 Will NNEW/Net-Enabled probabilistic Convective Wx Constraints are provided to Air Traffic Management (ATM) Decision Support Tools (DSTs)?"

- During OT the ATM DSTs must be verified to ensure that Convective Weather Avoidance Model (CWAM) or similar convective products are disseminated by the NNEW System.

COI 4 Will the reliability of the NNEW system support the weather dissemination mission?

- During Developmental Testing (DT) and OT, the NNEW system must be monitored and analyzed to verify that the reliability requirements are met.

COI 5 Will the NNEW system is maintainable at the appropriate level of repair?

- During DT, a representative NNEW system configuration must be analyzed using vendor data to verify planned down-time requirements using measures of reliability (Mean Time to Repair).

COI 6 Will the NNEW System is available to support the weather dissemination mission?

- During DT and OT, the NNEW system must operate continuously to provide a measurement of the NNEW system's operational availability (Ao) during extended periods of operations. Failure-mode testing must be performed to verify system failure recovery operational procedures.

COI 7 Will the NNEW system interoperate with intra-agency and inter-agency weather services in a manner that protects the security of the NAS from external users?

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- During DT and OT boundary protection security measures must be verified to ensure that no harm to the security of the FAA NAS can take place at the NAS Enterprise Service Gateway.

COI 8 Will the NNEW system disseminate weather data to and from internal and external NAS systems per the System Specification?

- During OT, the NNEW interfaces must be verified using live NAS systems to test the ability of NNEW to provide weather data to both internal and external NAS interfaces.
- During DT and OT, NNEW System interfaces must be load tested to ensure that the interface can meet performance requirements at maximum loads.

9.2 Test and Evaluation Requirements

9.2.1 System Test

System Testing is composed of the following three components: 1 - Developmental Testing (DT), 2 - NAS Integration and Operational Testing (OT), and 3 - Production Acceptance Testing (PAT). The NNEW Contractor will be responsible for the conduct of DT and PAT while the FAA will be responsible for OT. System Testing addresses the objectives presented in Table 1.

	System Tests		
System Test Objectives	**DT**	**OT**	**PAT**
Verify contractor compliance to functional and performance requirements.	X		
Verify the engineering design, development, and maintenance process.	X		
Verify system compliance to electromagnetic interference requirements.	X		
Identify deficiencies in system design and documentation, deficiencies in the NAS, deficiencies in the system hardware and software, deficiencies in human performance factors, or deficiencies in operational concepts.	X	X	
Identify risks and demonstrate mitigation of risks.	X	X	
Resolve Critical Operational Issues.		X	
Assess operational effectiveness and suitability of the NNEW System including the human component.	X	X	
Verify that the NNEW System meets reliability, maintainability, and availability requirements.	X	X	
Evaluate the compatibility and interoperability with existing or planned systems or equipment.	X	X	X
Assess NNEW System operations in degraded mode.	X	X	X
Assess the site adaptability of the NNEW System.	X	X	X
Verify the adequacy of manuals, handbooks, and other documentation materials for operations, maintenance, and training.	X	X	
Assess the degree to which the NNEW system can be operated and maintained by users in an operational environment.		X	
Verify NNEW System operations under stress and NAS loading.	X	X	
Assess NAS end-to-end performance with the NNEW system installed to ensure that pre-existing NAS functionality is not degraded.	X	X	
Ensure that production units are of consistent quality and are equivalent to the first article.			X
Verify that installation and integration of fielded systems is consistent with the approved Preparation, Installation, and Checkout Plan and the approved System Implementation Requirements.			X

Table 1: System Test Objectives

9.2.1.1 Developmental Test

DT must be performed by the Contractor and witnessed by the FAA to verify that the contractor has met FAA requirements and specifications. (The purpose of DT is to ensure that the NNEW System is ready for OT. Entrance into the test requires baselined requirements and a completed and approved Contractor Master Test Plan.)

9.2.1.1.1 DT Objectives

DT must verify: 1 - the NNEW system meets all physical, functional, interface and performance requirements specified in the NNEW specifications, 2 - the developed software has been

correctly integrated with commercial off-the-shelf hardware and 3 - the developed interfaces are correctly implemented according to applicable IRDs.

9.2.1.1.2 DT Components

9.2.1.1.2.1 Software Integration Tests

The contractor must conduct software integration testing which may be witnessed informally by the Government. (Testing is accomplished using threads that have been mapped to requirements and computer software components. Software integration testing must verify that the developed hardware and software meet the requirements of NNEW System specifications and that the NNEW system is ready for formal acceptance testing.)

9.2.1.1.2.2 Interoperability Test

NNEW will interface with multiple NAS systems (e.g., FTI, SWIM, ATOP, DOTS, NWP, ERAM) and external systems from the National Weather Service (NWS) (e.g., OpsPSnNet, NWS Registry/Repository, NWSTG, etc.).

9.2.1.1.2.2.1 The NNEW Contractor must perform development interoperability testing to provide early assessments of NNEW interface software.

Formal interoperability testing will take place between the NNEW development system and the NWS, SWIM Registry/Repository, and available FAA systems at the William J. Hughes Technical Center (WJHTC) prior to Factory Acceptance Test (FAT).

The planned early developmental interoperability testing will facilitate the following:

- Early verification of interface requirements
- Analysis of the impact of communication between NNEW and NWS via the NAS Enterprise Security Gateway (NESG)
- Early verification of NNEW service adapter to reduce risks
- Early verification of end-to-end interface requirements of NAS systems in place at the WJHTC and other ARTCC locations prior to Operational Test

9.2.1.1.2.3 Factory Acceptance Test

9.2.1.1.2.3.1 The NNEW Contractor must plan and conduct a DT Factory Acceptance Test (FAT) of the NNEW System. The purpose of the

DT FAT is to verify the capability of NNEW to meet all physical, functional, interface, and performance requirements.

9.2.1.1.2.3.2 The NNEW Program must formally witness the DT.

9.2.1.1.2.3.3 The NNEW Contractor must perform the DT FAT at the contractor's facility and encompasses hardware, software, and system testing.

9.2.1.1.2.3.4 The NNEW Contractor must perform DT FAT using contractor-developed test plans and procedures.

9.2.1.1.2.3.5 The NNEW Program must approve the DT Plan prior to the start of DT FAT.

9.2.1.1.2.3.6 The NNEW Program must approve DT procedures prior to the start of DT FAT.

9.2.1.1.2.4 Site Acceptance Test (SAT)

The purpose of the SAT activities is to verify the capabilities of the NNEW System to meet physical, functional, interface, and performance requirements specified in TBD. DT SAT activities will re-verify a subset of the DT testing requirements to ensure the contractor maintains a baselined system. SAT will take place at the WJHTC and designated operational facilities where the NNEW System is deployed, as required.

9.2.1.1.2.4.1 The NNEW Contractor must plan and conduct a DT SAT of the NNEW system.

9.2.2 Operational Test

9.2.2.1 The NNEW Program must test the operational effectiveness and suitability of the equipment with user participation in the evaluation testing.

The objectives of effectiveness and suitability tests as per the FAA Acquisition Management System Test and Evaluation Process Guidelines are listed as follows:

1. Reliability, maintainability, and availability
2. Degraded operations and operational utilization scenarios

3. Stress and NAS loading testing of all inter-operable subsystems
4. Human factors
5. Safety and security
6. Site-adaptation data
7. Transition switch over

During operational test, key site personnel will monitor and maintain the NNEW system for a period of time. Where needed, interfaces will be configured to receive weather data from either NNEW or the legacy data provider. The NNEW Test Team will develop user questionnaires to gather feedback from operational users on the operational usefulness of the NNEW capabilities.

9.2.3 Production Acceptance Test

NNEW PAT will occur after an In-Service Readiness (ISR) decision. PAT SAT is the testing vehicle used by the NNEW Contractor to verify the equipment and software have been installed properly. The PAT is a checkout test verifying all data to / from external interfaces are available and functioning between NNEW, FTI, NWS, clients, and other weather data providers.

9.3.3.1 The NNEW Contractor must prepare and conduct a PAT SAT of the NNEW System at each operational site after successful installation and checkout.

9.2.4 Independent Operational Assessment

If required, independent tests will be conducted by the Office of Independent Safety Assessment. IOT&E will be conducted by the Integrated Safety Management (ISM) team. IOT&E will be performed on the NNEW System in its normal operational mode to assess whether the program's critical operational issues have been resolved.

9.2.4.1 IOT&E COI Resolution & Operational Readiness Assessment

The ISM Test Team will analyze IOT&E data, conduct testing, and collect data to support the resolution of each of the COIs cited in Section 9.1. For each COI, a determination is first made on the sufficiency of data. If there are sufficient data, an assessment of the COI is made. Each COI will be assessed as Satisfactory, Partially Satisfactory, or Unsatisfactory, based on the data collected for each COI and on the operational experience of the ISM Test Team members.

The assessment of the COIs will be used to determine the system's Operational Readiness, based

on its operational effectiveness and operational suitability. Operational Effectiveness is the degree to which a product accomplishes its mission when used by representative personnel in the expected operational environment. Operational Suitability is the degree to which a product intended for field use satisfies its availability, compatibility, transportability, interoperability, reliability, maintainability, safety, human factors, logistics supportability, documentation, personnel, and training requirements.

Systems may be assessed as:

- Operationally Effective/Suitable: the COIs were assessed, and the system meets or exceeds the operational requirements defined by the COIs
- Partially Operationally Effective/Suitable: most or all of the COIs were assessed, and those COIs assessed as unsatisfactory are not critical enough to rate the system as Not Operationally Effective/Suitable
- Not Operationally Effective/Suitable: most or all of the COIs were assessed, and the system meets none or very few of the operational requirements expressed in the COIs, or at least one of the COIs has operational shortcomings that are considered critical enough to rate the system as Not Operationally Effective/Suitable

If the majority of the COIs were not able to be assessed, the team may recommend that a future IOT&E be conducted.

If, as a result of NNEW IOT&E, the ISM Test Team determines that the system is not operationally ready, the team will recommend to the ATO Safety office that the system be returned to AJW for further development and/or corrective action. Also, if the ISM Test Team discovers significant critical issues upon entering IOT&E, it may recommend that the system be returned to AJW for further development prior to IOT&E conclusion. During the conduct of IOT&E, the Office of Independent Safety Assessment may withdraw the system if it determines that further development and/or corrective action is required before IOT&E proceeds.

9.2.4.2 Dependencies/Prerequisites for IOT&E

The conduct of NNEW IOT&E is dependent on the following conditions:

- IOT&E Readiness Declaration (IOTRD) completion and acceptance
- Site declaration of IOC for use of NNEW

The IOTRD should include evidence of:

- Release and installation of the NNEW software version which is intended for commissioning
- Completion of representative training for participants

- Completion of draft maintenance manuals
- Site Acceptance by the FAA

9.2.4.3 IOT&E Management

The NNEW IOT&E will be planned, conducted, and reported on the ISM Test Team. The Test Team's responsibilities encompasses the monitoring of System Test, the preparation of IOT&E plans and procedures, the coordination with facilities to obtain resources, the collection of data, the assessment of the data, and the reporting of results.

9.2.5 Field Familiarization

Field familiarization activities are conducted to verify that the new system can be operated and maintained successfully in an operational environment without degrading air safety. It also confirms the readiness of site personnel, procedures, documentation, logistics, and technical support for operational use.

10 Implementation and Transition

10.1 Implementation

10.2 Implementation Planning

10.2.1.1 The NNEW Program must develop an NNEW Product Implementation Plan in accordance with the FAA Document Template for Implementation Strategy and Planning dated April, 2011.

10.2.1.2 The NNEW Program must develop an NNEW Generic Site Implementation Plan in accordance with the FAA Document Template for Implementation Strategy and Planning dated April, 2011.

10.2.1.3 The NNEW Program must complete a Site Survey to determine whether modifications to assigned space and other site preparations are necessary for the installation and integration of NNEW into the NAS.

10.2.1.4 The NNEW Program must provide an implementation approach for Physical Equipment and Facilities.

10.2.1.5 The NNEW Program must provide an implementation approach that ensures continuity of full ATC services.

10.2.1.6 The NNEW Program must maintain ATC operational capability during implementation activities. (Note: Activities include installation and/or removal of any equipment used for transition between old and new operations.)

10.2.1.7 The NNEW Program must identify office, administrative, contractor, and FAA workspace. (Note: Workspace is identified via system specifications and site surveys.)

10.2.2 Site Preparation

10.2.2.1 The NNEW Program must provide site preparation engineering support.

10.2.2.2 The NNEW Program must prepare generic engineering packages to support NNEW.

10.2.2.3 The NNEW Program must prepare site-specific engineering packages to support NNEW at a specific site.

10.2.2.4 The Contractor must provide revisions to specific site preparation activities in time to allow their incorporation prior to system delivery.

10.2.2.5 The Contractors must provide revisions to specific site requirement activities in time to allow their incorporation prior to system delivery.

10.2.2.6 The NNEW Program must arrange for construction of site-specific facility modifications.

10.2.2.7 The NNEW Program must oversee construction of site-specific facility modifications. (Note: The Contractor will not perform site preparations unless authorized by the FAA.)

10.2.2.8 The NNEW Program must oversee site preparation activities. (Note: Site preparations are based on the requirements received from the Integrated Product Team (IPT) responsible for the project. These requirements are derived and expanded from the Facilities Interface Requirements Document.)

10.2.3 Fit-up Activities

10.2.3.1 The Contractor's fit-up activities must not degrade AT operations. (Note: Fit-up activity controls and minimizes noise, dust, disturbing light, and excessive traffic in critical areas.)

10.2.3.2 The Contractor fit-up work must be performed accordance with FAA-G-2100, Electronic Equipment, General Requirements; NFPA 70, National Electrical Code, and state and local codes.

10.2.4 Equipment Delivery/Installation

10.2.4.1 The NNEW Program must coordinate equipment delivery to ensure that personnel are available to accept deliveries at established times.

10.2.4.2 The NNEW Program must coordinate equipment delivery to ensure that internal space is available to accept deliveries at established times.

10.2.4.3 The NNEW Program must coordinate equipment delivery to ensure that external space is available to accept deliveries at established times.

10.2.4.4 The Contractor must be responsible for determining the conditions necessary for interim

secure storage of delivered equipment.

10.2.4.5 The Contractor must be responsible for determining the conditions necessary for interim secure storage of delivered supplies.

10.2.4.6 The Contractor must be responsible for moving NNEW equipment into the facility.

10.2.4.7 The Contractor must be responsible for placing NNEW equipment in the installation location.

10.2.4.8 The Contractor must be responsible for installing NNEW equipment.

10.2.5 Initial System Activation

10.2.5.1 The NNEW Program must ensure that initial power-up testing is performed on non-operationally critical power centers.

10.2.5.2 The NNEW Program must test electrical equipment for power compatibility prior to connection to FAA critical power panels.

10.2.6 Equipment Removal/Disposal and Site Restoration

10.2.6.1 The NNEW Program must provide an equipment removal plan that identifies the procedures and methodology for the physical separation of legacy systems from the NAS. (Note: The Contractor will be responsible for the physical disconnection of legacy systems (e.g., WARP). The FAA will be responsible for the actual disposal. The procedures are intended to reduce the risk to ATC operations caused by loss of services.)

10.2.6.2 The NNEW Program must ensure that equipment removal and site restoration activities do not degrade AT operations.

10.2.6.3 The NNEW Program must ensure that equipment removal and site restoration activities do not impede access to critical areas.

10.2.6.4 The NNEW Program must ensure that during equipment removal and site restoration activities that noise, dust, disturbing lighting, and excessive traffic in critical areas is controlled.

10.2.6.5 The NNEW Program must dispose of equipment in accordance with FAA Order 4800.2, Utilization, and Disposal of Excess and Surplus Property; FAA Order 4660.8, Real Property Management and Disposal; and 40 CFR, RCRA Standards. (Note: A disposal plan is required when physical equipment, real property, or system components are to be removed.)

10.2.6.6 The NNEW Program must check for precious metals.

10.3 Integration

10.3.1 Integration Planning

10.3.1.1 The NNEW Program must develop an integration plan for in-service integration activities.

10.3.1.2 The NNEW Program must develop an integration plan for Physical Equipment and Facilities.

10.3.1.2.1 The NNEW Program must develop an integration plan for facility equipment, space, operations, and personnel procedures.

10.3.1.2.2 The NNEW Program must execute the integration plan to ensure that integration has no adverse impact on ATC operations.

10.3.1.2.3 The NNEW Program must implement an integration strategy that ensures continuity of full ATC services. (Note: Activities include installation and removal of any equipment used to integrate old and new operations.)

10.3.1.2.4 The NNEW Program must implement an integration strategy which includes integration and acceptance testing of NNEW.

10.3.1.2.5 The NNEW Program must implement an integration strategy that includes interfaces and external facilities to ensure the continuity of En Route air traffic control services.

10.3.1.3 The NNEW Program must implement redundancy and fallback capabilities that are maintained throughout the integration process.

10.3.2 Integration/Test

10.3.2.1 The NNEW Program must implement an integration strategy that includes procedures and a methodology for the physical integration of NNEW into the NAS. (Note: The procedures are intended to reduce the risk to ATC operations caused by loss of services.)

10.3.2.2 The NNEW Program must provide human resources for integration and test activities.

10.3.2.3 The NNEW Program must ensure operational interruptions or changes in operational procedures are defined, examined, evaluated, and managed through an integration plan.

10.4 Transition

10.4.1 Transition Planning

10.4.1.1 The NNEW Program must provide a Transition Plan that includes planning for facility equipment, space, operations, and personnel impacts and procedures.

10.4.1.2 The NNEW Program must ensure the Transition Plan imposes no adverse impacts on ATC operations.

10.4.1.3 The NNEW Program must ensure the Transition Plan addresses planning installation, integration, and acceptance testing of the equipment.

10.4.1.4 The NNEW Program must ensure the Transition Plan includes procedures for the physical transition of NNEW into the NAS. (Note: The procedures are intended to reduce the risk to ATC operations caused by loss of services.)

10.4.1.5 The NNEW Program must ensure the Transition Plan includes the transition approach for Operations, Physical Equipment, and Facilities.

10.4.1.6 The NNEW Program must ensure the Transition plan provides continuity of full ATC services.

10.4.2 Redundancy, Fallback, and Simultaneous Operation

10.4.2.1 The NNEW Program must provide redundancy/fallback capabilities are maintained throughout the transition process.

10.4.2.2 The NNEW Program must support NNEW support in-service transition activities with

related systems.

10.4.2.3 The NNEW System must have manual switching between itself and legacy systems.

10.4.2.4 The NNEW Program must maintain NNEW operational capability during transition. (Note: Activities include installation and removal of any equipment used for transition between old and new operations.)

10.4.2.5 The NNEW Program must ensure the NNEW transition strategy includes interfaces and external facilities to ensure the continuity of Air Traffic weather operations.

10.4.2.6 The NNEW Program must manage operational procedures through the Transition Plan.

10.5 In-Service Review Checklist

10.5.1 The NNEW Program must provide a tailored In-Service Review Checklist template to asses.

11 Quality Assurance

11.1 Quality Assurance Program

11.1.1 The NNEW Program must implement Quality Assurance (QA) in accordance with using ANSI/ISO/ASQ Q9001-2008.

11.1.2 The NNEW Program must implement QA in accordance with the FAA Quality Assurance for Program Management - Acquisition Practices Toolkit located at the FAA Acquisition Practices Overview website.

11.1.3 The NNEW Program must perform QA in accordance with the NNEW Quality Assurance Plan.

11.1.4 The NNEW Program must provide a QA Team that has the responsibility and authority to identify and evaluate quality problems and to initiate, recommend, and provide solutions.

11.1.5 The NNEW Program must perform QA procedures and controls to ensure adequate configuration management during all stages of the program life-cycle.

11.1.6 The NNEW Program must implement QA controls to ensure that all inspection and testing are performed in compliance with FAA contract requirements and that all test data is complete, correct, traceable, repeatable, and acceptable.

11.1.7 The NNEW Program QA Team must maintain a proper record-keeping function to provide objective evidence and traceability of operations performed.

11.1.8 The NNEW Program must implement QA procedures and controls to ensure that all software products and services procured from subcontractors conform to FAA contract requirements.

11.1.9 The NNEW Program must implement QA procedures and controls to ensure that all documentation is adequately reviewed and meets FAA contract requirements.

11.1.10 The NNEW Program must implement QA procedures and controls to prevent software and system deficiencies; detect and analyze deficiencies when

they do occur; and have procedures for corrective action.

11.1.11 The FAA must assign a Quality Reliability Officer (QRO) to monitor the NNEW Contractor's quality assurance system, and to accept or reject systems, equipment, and material, as dictated by the terms of the NNEW System development contract.

11.2 Quality Assurance Controls

11.2.1 The NNEW Program must develop a Quality Assurance Plan.

11.2.2 The NNEW Program must implement quality controls in accordance with the NNEW Program's Quality Assurance Plan (e.g., NNEW Contractor status reporting, quality metrics, peer review, and independent verification and validation.).

11.2.3 The NNEW Contractor must develop a Quality Assurance Plan in accordance with the ANSI/ISO/ASQ Q9001-2008.

11.2.4 The NNEW Contractor must implement a quality assurance program in accordance with the NNEW Contractor's FAA approved Quality Assurance Plan.

11.2.5 The NNEW Contractor must develop a Quality Control Plan in accordance with NNEW Program Quality Assurance Plan.

11.2.6 The NNEW Contractor must implement a Quality Control Program in accordance with the NNEW Contractor's FAA approved Quality Control Plan.

11.2.7 The NNEW Contractor must document processes for software development in accordance with DID-FAA-026-23, *Software Quality Assurance Plan*.

11.3 Quality Assurance for Services

11.3.1 The NNEW Program must implement QA procedures and controls, in accordance with the NNEW Program's Quality Assurance Plan. (The goal is to detect and analyze service deficiencies when they do occur; and have procedures for corrective action).

12 Configuration Management

12.1 Configuration Management Program

12.1.1 The NNEW Program must develop a Configuration Management Plan in accordance with FAA Order 1800.66 –chg2, Configuration Management Policy, and Military Handbook (MILHDBK) 61A(SE).

12.1.2 The NNEW Contractor must implement the FAA's approved Contractor's Configuration Management Plan.

12.2 Configuration Management Activities

12.2.1 The NNEW Program must implement life-cycle configuration management for NNEW System software.

12.2.2 The NNEW Program must implement life-cycle configuration management for NNEW System hardware.

12.2.3 The NNEW Program must implement life-cycle configuration management for NNEW System data.

12.2.4 The NNEW Program must implement life-cycle configuration management for NNEW System documentation.

12.2.5 The NNEW Program must implement life-cycle configuration management for NNEW System interfaces.

12.2.6 The NNEW Program must implement life-cycle configuration management for NNEW System tools.

13 In-Service Management

13.1 Maintenance Policy

13.1.1 The NNEW Program must develop an Integrated Logistics Support Plan (ILSP) in accordance with FAA Order 6000.30, National Airspace System Maintenance Policy.

13.1.2 The NNEW Program must develop an Integrated Logistics Support Plan (ILSP) in accordance with FAA Order 6000.15F-chg2, General Maintenance Handbook for National Airspace System (NAS) Facilities.

13.1.3 The NNEW Program must implement a Integrated Logistics Support Program in accordance with the NNEW Program's FAA approved Integrated Logistics Plan.

13.2 Performance Monitoring

13.2.1 In-Service Management (ATO) must monitor NNEW System performance in the operational environment in accordance with FAA Order 6000.53C, April 25, 2011, Remote Maintenance Monitoring Interface Development and Implementation.

13.2.2 The NNEW Program must develop an Operational Analysis (OA) plan for the NNEW System in compliance with OMB circular A-11 and Federal Aviation Administration Operational Analysis Guidance Document, Version 1.0 dated August 2009. (Methods of assessing system performance include Remote Monitoring and Logging System (RMLS), National Operations Control Center (NOCC) reports, and telephone contacts from regional airway facilities offices, employee suggestions, and NAS Change Proposal (NCP) submittals.)

13.2.3 Support facilities

13.2.3.1 The NNEW Program must be responsible for any support equipment required for maintenance of the NNEW System components.

13.3 Configuration

13.3.1 The NNEW Program must maintain the operational baseline configuration of the

NNEW System, including product baseline hardware and software configuration and user documentation, data, interfaces, and tools in accordance with FAA Order 1800.66-chg2, Configuration Management Policy.

13.4 Changes

13.4.1 The NNEW Program must make changes to the baseline configuration, in accordance with the NNEW System Support Directive (SSD) policy, FAA Order number 1320.58A, Instructions for Writing Notices, Maintenance Technical handbooks, and SSD's. (Note: ATO-T will work in concert with the NNEW Product Team to determine whether operational and dollar benefits are being achieved for the duration of the life cycle. The capacity of deployed assets will be constantly monitored to anticipate emerging demand for services so that replacement or upgraded capabilities can be obtained and in place when needed.)

14 System Safety Management

14.1 General

14.1.1 The NNEW Program must conduct Safety Management in accordance with ATO JO Order 1000.37, ATO Safety Management System and the ATO System Safety Manual, V2.1.

14.1.2 The NNEW Program must conduct safety analysis in accordance with Safety Risk Management Guidance for System Acquisitions (SRMGSA), Version 1.5.

14.2 Safety Risk Management

14.2.1 The NNEW Program must conduct Safety Risk Management for the NNEW System in accordance with current safety mandates for system acquisition described in FAA Safety Orders:

a) FAA Order 8040.4, Safety Risk Management
b) FAA Order 1100.161, Air Traffic Safety Oversight
c) FAA Order 1800.66-ch2 Configuration Management Policy
d) FAA Safety Risk Management Guidance for System Acquisitions (SRMGSA) ATO-S 2008-12 (Meets Section 4.12 of AMS)
e) FAA Order JO 1030.1A that establishes Air Traffic Organization Safety Guidance (ATO-SG) including:
f) ATO SMS Order JO 1000.37, Air Traffic Organization Safety Management System
g) ATO SMS Manual Version 2.1
h) AJW Service Unit Orders/Directives including Technical Operations specific policy and guidance including:
i) Technical Operations Safety Risk Management Policy Memorandum of March 2008.
j) Technical Operations Safety Guidance for SRMD Mitigation Monitoring, ATO-W-SG-09-01 of April 2009
k) Technical Operations Safety Guidance for SMS Roles and Responsibilities, ATO-W-SG-09-02 of September 2009

14.3 Safety Assessments

14.3.1 The NNEW Program must conduct NNEW safety assessments. (Operational Safety Assessment (OSA), in the AMS Mission Analysis phase, Comparative Safety Assessment (CSA) on the identified alternatives in support of Investment Analysis Decision (IID and a Preliminary Hazard Analysis (PHA) on the preferred alternative to support Final Investment Decision (FID)).

14.3.2 The NNEW Program must develop safety risk analysis requirements in the

Program Safety Plan (PSP).

14.4 Program Safety Plan

14.4.1 The NNEW Program must develop an integrated Program Safety Plan (PSP). (The PSP may include a Sub-System Hazard Analysis (SSHA), System Hazard Analysis (SHA), Operations and Support Hazard Analysis (O&SHA), Health Hazard Assessment (HHA), and includes utilization of a Hazard Tracking and Risk Resolution System (HTRR).)

14.5 Risk Acceptance and Safety Risk Management Documentation Approval

14.5.1 The NNEW Program must conduct risk acceptance and documentation approval procedures in compliance with the Program Safety Plan (PSP) and ASD-100-SSE-1 FAA System Safety Management Program.

Appendix 1: TBD Requirement Traceability Matrix

TBD

Appendix 2: Acronyms

4-D Wx SAS	4-Dimensional Weather Single Authoritative Source
ADAS	Automated Weather Observation Data Acquisition System
AGL	Above Ground Level
AMS	Acquisition Management System
ANSP	Air Navigation Service Provider
ARTCC	Air Route Traffic Control Center
ATM	Air Traffic Management
ATOP	Advanced Technologies and Oceanic Procedures
CAI	Contractor Acceptance Inspection
CSA	Consumer Service Adaptor
CIWS	Corridor Integrated Weather System
CONOPS	Concept of Operations
CONUS	Contiguous United States
COTS	Commercial Off The Shelf
CSA	Comparative Safety Assessment
CSGDM	Content Standard for Digital Geospatial Metadata
NOAA 4-D Wx Data Cube	National Weather Service 4-Dimensional Weather Data Cube
DOTS	Dynamic Ocean Tracking System
DSR	Display System Replacement
ERAM	En Route Automation Modernization
EXI	Efficient XML Interchange
FAA	Federal Aviation Administration
FDP2K	Flight Data Processor 2000
FGDC	Federal Geographic Data Committee's
FTI	FAA Telecommunications Infrastructure
FTP	File Transfer Protocol
GML	Geography Markup Language
GRIB	Gridded Binary
HHA	Health Hazard Assessment
HTRR	Hazard Tracking and Risk Resolution

HTTP	Hyper Text Transfer Protocol
ICAO	International Civil Aviation Organization
ICD	Interface Control Document
IOC	Initial Operational Capability
IRD	Interface Requirements Document
ISO	International Standards Organization
ISP	Integrated Safety Plan
ITWS	Integrated Terminal Weather System
JMBL	Joint METOC broker Language
JMS	Java Messaging Service
JMX	Java Management Extensions
JPDO	Joint Planning Development Office
LSA	Logistic Support Analysis
MDCRS	Meteorological Data Collection and Reporting System
MSL	Meters Above Sea Level
MTOM	Message Transmission Optimization Mechanism
NAM	North American Mesoscale
NAS	National Airspace System
NAVAID	Navigation Aid
NESG	NAS Enterprise Security Gateway
NetCDF	Network Common Data Form
NEXRAD	Next Generation Weather Radar
NextGen	Next Generation Air Transportation System
NNEW	NextGen Network Enabled Weather
NIDS	NAS Information Display System
NOAA	National Oceanic and Atmospheric Administration
NWP	NextGen Weather Processor
NWS	National Weather Service
O&SHA	Operations and Support Hazard Analysis
OGC	Open Geospatial Consortium
ORD	Operational Capability Requirements Document
OSA	Operational Safety Assessment
OWL	Web Ontology Language
PCF	Physical Configuration Audit

PSA	Provider Service Adaptor
PHA	Preliminary Hazard Analysis
pPR	Preliminary Program Requirements
PSF	Program Support Facility
RASP	Regional ADAS Service Processor
RDF	Resource Description Framework
RI	Reference Implementation
RUC	Rapid Update Cycle
RWI	Reduced Weather Impact
SA	Service Adaptor
SAML	Security Assertion Markup Language
SensorML	Sensor Markup Language
SHA	System Hazard Analysis
SLA	Service Level Agreement
SNMP	Simple Network Management Protocol
SOA	Service Oriented Architecture
SRMGSA	Safety Risk Management Guidance for System Acquisitions
SSHA	Sub-System Hazard Analysis
SV-4	System View - 4
SWIM	System Wide Information Management
TFMS	Traffic Flow Management System
TRACON	Terminal Radar Approach Control
URET	User Request Evaluation Tool
WARP	Weather and Radar Processor
WCS	Web Coverage Service
WFS	Web Feature Service
WINS	Weather Information Network Server
WS	Web Service
WSDL	Web Service Description Language
Wx	Weather
WXXM	Weather Information Exchange Model
XACML	Extensible Access Control Markup Language
XML	Extensible Markup Language
XPath	XML Path

XQuery	XML Query
XSD	XML Schema
XSLT	XML Stylesheet Language Transformation

Appendix 3: Terms and Vocabulary

The list below defines terminology associated with the requirements with which the reader may not be familiar.

2-D Region: A region defined by (x,y), (y,z), or (x,z) coordinate points.
3-D Bounded Box: A volume defined by (x,y,z) coordinate points.
Add Wx Metadata Subscriptions: To allow users to subscribe to Wx Metadata Update Notifications
Add Wx Metadata: To register new weather metadata
Airway: An officially designated air route with sectors defined as specific courses to or from directional radio stations.
Altitude: The height of a level, point, or object measured in feet Above Ground Level (AGL) or from Mean Sea Level (MSL)
Assign Data Expiration Condition: To set the threshold by which the data will be removed from where it is stored.
Authenticate Wx Consumer: To examine, validate, and confirm the identity claims of the user or system attempting to gain access to the System
Authorize Wx Consumer: To examine, validate, and confirm the access claims of the user or system on the System
Cache Image Formatted Data: To temporarily maintain the existence of image weather data in memory.
Cache NetCDF4 Formatted Data: To temporarily maintain the existence of NetCDF4 formatted weather data in memory.
Cache Proxy Data: To temporarily store large weather data sets using an HTTP based intermediary
Cache WXXM Formatted Data: To temporarily maintain the existence of WXXM formatted weather data in memory.
Complex Retrieval: A query service of the NNEW System where consumers can send a single query to produce multiple products, multiple product types, and/or multiple formats that are aggregated into an NNEW-specific format and returned to the consumer as a single response.
Constraint: The parameters used to define filtering requests, and the subsequent subset.
Contiguous United States: The 48 U.S. states on the continent of North America that are south of Canada, plus the District of Columbia

CONUS: *See Contiguous United States*
Convert Coordinate Systems: To alter the form of the weather data to another form
Convert Wx Measurements: To alter the form of the weather data to another form
Corridor: A volume surrounding a path between two points.
Create Logs: To make new logs
Create Reports: To make new reports
Data: The collection of datasets, products, and information provided by NNEW.
Design-Time Discovery: Discovery performed by developers while systems are under development.
Detect Intrusions: To actively watch for unauthorized access. Observe, collect and act on malicious intrusions and access to network, resources and data
Discovery: A capability of the System that allows data and metadata to be found.
Encode/Decode message: To construct or de-construct (or to convert, or translate from one form to another) the message for delivery based on the type and size of the message data (e.g. binary data may be encoded and decoded).
Enforce Wx Security: To exert authority over the ability to allow or deny access to systems, resources, and data.
Ensure Wx Data Message Confidentiality: To examine and validate that privacy was maintained during the communications process
Federate Wx Metadata: To enable searching for metadata across multiple, linked reg/reps
Federate: a federated registry consisting of a group of individual registry instances, each operated independently by a different NNEW member Organization. Interoperability between different repositories in the federation is enabled by the OASIS ebXML Reg/Rep 4 (draft) specifications.
Filter Wx Data Geospatially: To create a subset of weather data from a set of weather data using geographic or spatial parameters
Filter Wx Data Temporally: To create a subset of weather data from a set of weather data using time parameters
Filtering: The capability of extracting subsets of information from within a set of weather data.
Flight Level: A level of constant atmospheric pressure related to a reference datum of 29.92 inches of mercury. Each is stated in three digits that represent hundreds of feet. For example, flight level (FL) 250 represents a barometric altimeter indication of 25,000 feet, FL 255, an indication of 25,500 feet.
Forward ASR Data: To send ASR radar data without taking action on the data
Forward CANRAD Data: To send CANRAD radar data without taking action on the data

Forward NEXRAD Data: To send NEXRAD radar data without taking action on the data
Forward TDWR Data: To send TDWR radar data without taking action on the data
Generate Alerts: To supply a notification that a problem with the System has occurred
Geo-referenced map image: For the purposes of this specification, a subset of non-gridded data that consists of maps that are generally rendered in a pictorial format such as PNG, GIF, or JPEG, or occasionally as vector-based graphical elements in Scalable Vector Graphics (SVG) or Web Computer Graphics Metafile (WebCGM) formats. (Reference: OpenGIS® Web Map Server Implementation Specification OGC 06-042, Version 1.3.0). Also known as Map Data.
Geospatial Point: Any point in space defined by a user-specified latitude, longitude, and altitude
Geospatial Line: Any two geospatial points connected by a line segment
Geospatial Point: Any point in space defined by a user-specified latitude, longitude, and altitude
Geospatial 2-D Polygons: Any two-dimensional polygon of regular or irregular shape.
Geospatial 3-D Polygon: A three-dimensional polygon of regular or irregular shape.
Geospatial Circle: A two-dimensional plane of a circumscribed circle.
Geospatial Cylinder: A three-dimensional volume of a geometric shape that has parallel sides and a circular cross-section.
Geospatial Line: Any two geospatial points connected by a line segment
Gridded Data: Data that are represented as an N-dimensional (1 or more dimensions)—typically regularly spaced—grid of data values. For example, a vertical profile or a series of aircraft observations are a 1-dimensional grid. National radar composite without vertical information may be represented as a 2-dimensional (latitude/longitude) grid. The same radar composite with vertical information may be represented as a 3-dimensional grid. (Latitude/longitude/altitude above the surface).
Horizontal Cross-Section: The (x,y) plane.
Inspect Wx Data: To validate the message data to check against un-needed modification
Internal NAS: FAA side of firewall
Kill: abnormal shutdown – in case the system needs to be shutdown when it is hung or not responding etc.
Lambert Conformal Conic Projection: A type of conformal map in which features on a sphere are projected onto a cone. The cone can either be tangent to the sphere, for which contact is along one circle, or pass through the sphere, for which contact is along two circles.
Latitude/Longitude Projection: A projection that plots latitude and longitude degree coordinates as if they were Y and X coordinates
Latitude: The location north or south in reference to the equator, which is designated at zero (0) degrees. Lines of latitude are parallel to the equator and circle the globe. The North and South

poles are at 90 degrees North and South latitude.

Longitude: The location east or west in reference to the Prime Meridian, which is designated as zero (0) degrees longitude. The distance between lines of longitude is greater at the equator and smaller at the higher latitudes, intersecting at the earth's North and South Poles. Time zones are correlated to longitude.

Lookup Exact WX Keyword Match: To search for semantically equivalent entries according to a parameterized request

Lookup Inexact WX Keyword Match: To search for semantically similar entries according to a parameterized request

Lookup Relationships between Metadata: To search stored weather metadata by intra-schema relationships.

Map Data: *See Geo-Referenced Map Image.*

Map Projection: A map projection is any method of representing the surface of a sphere or other shape on a plane.

Mediate SOA Protocol: To apply intermediary transforming functions to SOA protocol for transport (e.g. JMS to HTTP Web proxy)

Mediate Wx Messages: To apply intermediary transforming functions to messages between providers and consumers

Mercator Projection: A cylindrical map projection with a linear scale that is constant in all directions around any point preserving the angles and the shapes of small objects, the Mercator projection distorts the size and shape of large objects, as the scale increases from the Equator to the poles, where it becomes infinite.

Metadata: Structured information that describes, explains, locates, or otherwise makes it easier to retrieve, use, or manage an information resource. Metadata is often called “data about data.”

Modify Wx Metadata: To change the weather metadata description

Modify Wx Metadata Subscriptions: To change existing subscriptions

NAS Projection (NAS Plane, NAS System Plane): A stereographic map projection coordinate system used to represent aircraft or weather position data on controllers' displays for En-Route and Oceanic Air Traffic Control in the National Airspace System (NAS). The map projection is formed by placing a map image plane tangent to the earth's surface at a location called the Point of Tangency. Target position data are converted from geodetic earth coordinates to conformal spherical coordinates followed by a conformal stereographic projection process whereby conformal spherical coordinates are converted to Cartesian Coordinates onto the tangential map image plane. This conversion process results in a highly accurate placement of 3-dimensional target positions onto a-2 dimensional display surface. Each Air Route Traffic Control Center

(ARTCC) has its own unique NAS system plane which is defined by the ARTCC's adapted Point of Tangency and the radius of the Conformal Sphere.

Nongridded Data: Data that does not fall into the category of gridded data. Non-gridded weather data are also referred to as features. Examples of non-gridded data formats are text, BUFR, and geo-referenced map images (e.g., GIF, JPEG).

Notify Wx Metadata Subscribers: Forward alerts to subscribers when Metadata Updates are made (based on subscriber-defined parameters)

Persist Image Format Data: To indefinitely maintain the existence of image weather data in physical storage.

Persist NetCDF4 Format Data: To indefinitely maintain the existence of NetCDF4 formatted weather data in physical storage.

Persist WXXM Format Data: To indefinitely maintain the existence of WXXM formatted weather data in physical storage.

Point: A single location on the dimensionless geospatial location.

Polar Radar Projection: *Definition to be supplied in a later version.*

Prioritize Messaging: To deliver messages based on the critical nature of the underlying message (e.g., high importance message are delivered before low importance messages).

Process Wx Data Response: To prepare a response for the consumer

Process Wx Request: To perform operations related to request protocol and specifications that messages use (e.g. HTTP, REST or SOAP SOA protocol engine)

Process Wx Response: To perform operations related to response protocol and specifications that messages use (e.g. HTTP, REST or SOAP SOA protocol engine)

Product category: *Need definition*

Product refresh: *Need definition*

Publish between One-to-Many: To deliver messages between one provider source and many receiver endpoints

Publish between Point-to-Point: To deliver messages between one provider source and one receiver endpoint

Publish Wx Messages: To push messages to consumers that have subscribed for message

Reduce Geographic Resolutions: To increase the horizontal spacing between grid points which decreases the size of the data file

Reduce Radar Reflectivity Resolutions: To decrease the amount vertical spacing radar sweeps through quantitization

Reformat Gridded Data into NetCDF4: To rearrange the Wx data into a predefined gridded data format

Reformat NetCDF4 into Legacy Gridded Data Format: To rearrange the Wx data into a predefined NetCDF4 format

Reformat Non-Gridded Data into WXXM: To rearrange the Wx data into a predefined non-gridded data format

Reformat WXXM into Legacy Non-Gridded Data Format: To rearrange the Wx data into a predefined WXXM format

Remove Wx Data: To eliminate the existence of weather data from where it is stored.

Remove Wx Metadata Subscriptions: Delete user's subscriptions (upon request)

Remove Wx Metadata: To delete stored weather metadata

Retrieve Gridded Wx Data: To query a data provider for gridded formatted data

Retrieve Image Wx Data: To query a data provider for Image formatted data

Retrieve Non-Gridded Wx Data: To query a data provider for non-gridded formatted data

Routing Message: To route messages based on data found in the message (e.g. content based routing of DEX or Camel in FUSE)

Runtime Discovery: Discovery performed by consumer systems automatically to ensure accessibility to dynamically changing weather information.

Sector: *TBD*

Secure Boundary: To defend the outer edges of the System as it is defined from unauthorized access.

Secure Messages: To protect message data from un-intended or malicious modifications between the sending and the receiving system

Sort Wx Metadata Lookup Results: To organize weather metadata search results based on user-defined criteria in search command

Sounding: A vertical profile of atmospheric properties over a specific location

Standard Atmospheric Pressure: Unit of Pressure defined as equal to 29.92 inHg or 1013.25 mb

Stereographic Projection: A type of conformal map in which features on a sphere are projected onto a plane tangent to the sphere

Stop: Normal shutdown

Store Logs: To preserve logs for future use

Store Reports: To preserve reports for future use

Store Wx Metadata: To record weather metadata

Subscribe To Queue Messaging: To register consumer for receiving data from queue (also called Point-to-Point) messaging channel

Subscribe To Topic Messaging: To register consumer for receiving data from topic (also called

Publish/Subscribe Channel or Brokered Notification) messaging channel

Subscribe WX Consumer: To register consumer for receiving data as it becomes available

Subscribe: Register for services, products and datasets

Subset: The data returned by a filtering capability.

Synchronize Wx Metadata: To ensure that all weather metadata of the NNEW System match

Synchronize: ensure that for each unique product/dataset that the weather metadata are identical—across all its components and across participating agencies

Trajectory: The path followed by an object moving through space

Transform Wx Map Projections: To perform a cartographic re-projection from one projection type to another

User: includes a machine system and a human

Verify Wx Message Integrity: To examine and validate that the Wx data (message) was not modified un-intended or maliciously in transit or at rest

Vertical Cross-Section: The (x,z) plane

Appendix 4: Functional Analysis Traceability Matrix

The following matrix provides traceability from the NNEW functional analysis to the requirements found in Section 3.1 of this Addendum.

Function#	Function	CATEGORY	ADDENDUM REQ#	Addendum Requirement Text
F.1.1.1	Accept Query Requests	Discover	3.1.1.1	NNEW must accept query requests for weather metadata.
F.1.1.2	Accept Notification Subscriptions	Discover	3.1.1.2	NNEW must accept weather metadata notification subscriptions
F.1.2.1	Receive Wx Metadata	Discover	3.1.1.3	NNEW must receive weather metadata about provider services and data
F.1.2.2.1	Map/Align Wx Metadata	Discover	3.1.1.4	NNEW must align weather metadata such that similar terms will be semantically searchable
F.1.2.2.2	Synchronize Wx Metadata	Discover	3.1.1.5	NNEW must synchronize weather metadata—i.e., ensure that for each unique product/dataset that the weather metadata are identical—across all its components and across participating agencies.
F.1.2.3	Store Wx Metadata	Discover	3.1.1.6	NNEW must store metadata
F.1.3.1	Lookup Exact Keyword Match	Discover	3.1.1.7	NNEW must search weather metadata based on exact keywords matching
F.1.3.2	Lookup Inexact Keyword Match	Discover	3.1.1.8	NNEW must search weather metadata based on inexact keyword matching
F.1.3.3	Lookup Wx Service Match	Discover	3.1.1.9	NNEW must search for weather services based on keyword matching
F.1.4.1	Update Wx Metadata	Discover	3.1.1.10	NNEW must change weather metadata
F.1.4.2	Remove Wx Metadata	Discover	3.1.1.11	NNEW must remove weather metadata
F.1.4.3	Notify Wx Metadata Changes	Discover	3.1.1.12	NNEW must notify consumers of weather metadata changes
F.1.5.1	Respond to Query Requests	Discover	3.1.1.13	NNEW must distribute weather metadata
F.1.5.2	Notify New Wx Metadata	Discover	3.1.1.14	NNEW must accept subscriptions to weather data
F.2.1.1	Accept Requests	Access	3.1.2.1	NNEW must accept requests for weather data
F.2.1.2	Accept Subscriptions	Access	3.1.2.2	NNEW must accept subscriptions to weather data
F.2.2	Retrieve Wx Data	Access	3.1.2.3	NNEW must retrieve gridded weather data
			3.1.2.4	NNEW must retrieve non-gridded weather data
			3.1.2.5	NNEW must retrieve weather data in geo-referenced map image file formats
			3.1.2.6	NNEW must retrieve legacy, binary-file formats

Function#	Function	CATEGORY	ADDENDUM REQ#	Addendum Requirement Text
F.2.2.1	Provide Unfiltered Wx Data	Access	3.1.2.7	NNEW must provide unfiltered weather data, i.e., provide the entirety of a requested product or dataset.
F.2.2.2	Filter Wx Data	Access	3.1.2.8	NNEW must subset weather data by the following: • Time • Above or below a value of weather parameter • 3-D Region • 2-D Region • Point • Circle about a point • Horizontal Cross Section • Vertical Cross Section • Trajectory • Corridor • Sounding
			3.1.2.9	NNEW must subset weather data by the following geographic locations, areas, and volumes: • Airport • ARTCC • Sector • TRACON • CONUS • Airway • NAVAID or named intersection
F.2.2.3	Transform Wx Map Projections	Access	3.1.2.10	NNEW must re-project from any to any of the following geographic projections: • Lambert Conformal Conic • Lambert Azimuthal Equal-Area • Latitude/Longitude • Mercator • Stereographic (including polar) • Polar Radar • NAS Projection
F.2.2.4.1	Convert Wx Measurements	Access	3.1.2.11	NNEW must convert from any to any of the following measures of altitude: • Flight Level • Meters Above Mean Sea Level (MSL) • Feet Above Ground Level (AGL) • Feet Above MSL • Standard Pressure
			3.1.2.12	NNEW must convert weather data between True North and Magnetic North
			3.1.2.13	NNEW must convert weather data between US customary units and metric units
F.2.2.4.2	Convert Wx Coordinate Systems	Access	3.1.2.14	NNEW must convert gridded weather data to lower resolutions

Function#	Function	CATEGORY	ADDENDUM REQ#	Addendum Requirement Text
F.2.2.4.3	Convert Wx Formats	Access	3.1.2.15	NNEW must convert between weather data formats, as follows: • JMBL and Climate & Forecast format • NetCDF-4 and GRIB2 • Climate and Forecast, NetCDF-4, & GRIB2 formats and formats used by legacy user
F.2.2.5	Process Requests	Access	3.1.2.16	NNEW must process requests for weather data
F.2.2.6	Process Subscriptions	Access	3.1.2.17	NNEW must process subscriptions for weather data
F.2.2.7	Cache Wx Data	Access	3.1.2.18	NNEW must cache weather data
F.2.2.8	Service Responses	Access	3.1.2.19	NNEW must service responses for weather data
F.2.2.9	Service Publications	Access	3.1.2.20	NNEW must service publications for weather data
F.2.3	Provide Complex Retrieval	Access	3.1.2.21	NNEW must service complex requests (i.e., requests that require a multiple-part response to satisfy)
F.2.4.1	Respond to Requests	Access	3.1.2.22	NNEW must respond to requests for weather data
F.2.4.2	Publish Wx Data	Access	3.1.2.23	NNEW must publish weather data in response to a subscription request
F.2.4.3	Provide Notification	Access	3.1.2.24	NNEW must provide a notification message in response to a request for notifications
F.2.5	Provide SAS	Access	3.1.2.25	NNEW must provide access to a deconflicted source of weather information
F.2.6.1	Ingest Wx Data	Access	3.1.2.26	NNEW must ingest weather data from legacy weather data providers
F.2.6.2	Store Wx Data	Access	3.1.2.27	NNEW must store weather data from legacy weather data providers
F.2.7	Adapt Legacy Consumers	Access	3.1.2.28	NNEW must adapt legacy consumers into legacy formats
F.3.1.1.1	Accept Log Requests	Manage Wx Services	3.1.3.1	NNEW must accept requests for logs
F.3.1.1.2	Create Logs	Manage Wx Services	3.1.3.2	NNNEW must log the event type, the specific event, the time of the event, and any alerts generated as a result of the event for each of the following event types: • Configuration changes to NNEW (Examples include temporary and permanent resource allocation changes, exclusions, and new services, etc.) • Additions to NNEW (Examples include new weather data, new service, new metadata, new provider, new consumer, etc.) • Updates to NNEW (Examples include changes to metadata, changes to a service, etc.) • Removals from NNEW (Examples include deletion of a service, deletion of metadata, etc.)

Function#	Function	CATEGORY	ADDENDUM REQ#	Addendum Requirement Text
			3.1.3.3	NNEW must log any request for information, what was requested, the identity of the requestor, the time of the request, an indication if the request was fulfilled or not, the time that the request was fulfilled, and the identity of the provider that fulfilled the request for the following dissemination types • Requests (examples include data, metadata, logs, etc.) • Responses (examples include data, metadata, logs, etc.)
			3.1.3.4	NNEW must log all errors, including the NNEW component that had the error, the type of error, the level of error (critical, non-critical, etc.), the time that the error occurred, any alerts that were generated as a result of the error, and any actions that were taken to isolate or correct the error
F.3.1.1.3	Store Logs	Manage Wx Services	3.1.3.5	NNEW must provide the capability to store logs
F.3.1.1.4	Distribute Logs	Manage Wx Services	3.1.3.6	NNEW must distribute logs in response to a request for logs
F.3.1.2.1	Accept Reports Requests	Manage Wx Services	3.1.3.7	NNEW must accept requests for reports
F.3.1.2.2	Create Reports	Manage Wx Services	3.1.3.8	NNEW must create reports for individual services and components of NNEW
			3.1.3.9	NNEW must create reports for usage statistics of NNEW
F.3.1.2.3	Store Reports	Manage Wx Services	3.1.3.10	NNEW must store reports
F.3.1.2.4	Distribute Reports	Manage Wx Services	3.1.3.11	NNEW must distribute reports in response to a request for reports
F.3.1.3	Provide Services Support	Manage Wx Services	3.1.3.12	NNEW must provide centralized service support
F.3.2.1	Detect Faults	Manage Wx Services	3.1.3.13	NNEW must manage faults by: • Detecting errors • Tracing and identifying failures • Performing diagnostic tests
F.3.2.2	Process Faults	Manage Wx Services	3.1.3.14	NNEW must process faults by ensuring that faults are isolated and that components affected recover and continue to operate
F.3.2.3	Provide Fault Notifications	Manage Wx Services	3.1.3.15	NNEW must provide notifications of faults
F.3.3	Provide SLA Compliance	Manage Wx Services	3.1.3.16	NNEW must be agile such that NNEW will continue to meet performance requirements during future service enhancements
F.3.4	Enforce Policy	Manage Wx Services	3.1.3.17	NNEW must categorize weather data into weather domains (e.g., designate data as single authoritative source, designate data as approved for use by pilots and dispatchers, etc.)

Function#	Function	CATEGORY	ADDENDUM REQ#	Addendum Requirement Text
F.3.5.1	Add Wx Services	Manage Wx Services	3.1.3.18	NNEW must support mediation services for interoperability for different data standards
			3.1.3.19	NNEW must support the capability of making new weather services available
F.3.5.2	Remove Wx Services	Manage Wx Services	3.1.3.20	NNEW must support the capability of removing weather services
F.3.5.3	Provide Change Notifications	Manage Wx Services	3.1.3.21	NNEW must provide change notifications when services are added/removed
F.4.1.1	Authenticate Enterprise Users	Security	3.1.4.1	NNEW must identify information NNEW users, processes acting on behalf of users, and devices
			3.1.4.2	NNEW must authenticate the identities of users, processes, and devices as a prerequisite to allowing access to NNEW resources
F.4.1.2	Authorize Enterprise Users	Security	3.1.4.3	NNEW must limit access to NNEW resources to authorized users, processes acting on behalf of users, and devices
			3.1.4.4	NNEW must limit access to NNEW resources to the types of transactions and functions that authorized users are permitted to exercise
F.4.2.1	Authenticate External Users	Security	3.1.4.5	NNEW must identify external information NNEW users, processes acting on behalf of external users, and external devices
			3.1.4.6	NNEW must authenticate the identities of external users, external processes, and external devices as a prerequisite to allowing access to NNEW resources
F.4.2.2	Authorize External Users	Security	3.1.4.7	NNEW must limit access to NNEW resources to authorized external users, processes acting on behalf of external users, and external devices
			3.1.4.8	NNEW must limit access to NNEW resources to the types of transactions and functions that authorized external users are permitted to exercise
F.4.2.3	Inspect Wx Data	Security	3.1.4.9	NNEW must provide weather data inspection for data crossing the enterprise boundary
F.4.3.1	Guarantee Wx Message Data Integrity	Security	3.1.4.10	NNEW must provide for integrity of messages exchanged between providers and consumers
F.4.3.2	Ensure Wx Message Data Confidentiality	Security	3.1.4.11	NNEW must provide for the confidentiality of messages exchanged between providers and consumers
F.4.4.1	Provide Audit Trail	Security	3.1.4.12	NNEW must create, protect, and retain audit records to enable monitoring, analysis, investigation, and reporting of unlawful, unauthorized, or inappropriate NNEW activity
			3.1.4.13	NNEW must have the capability to trace the actions of individual users to those users
F.4.5.1	Administer Security Policy	Security	3.1.4.14	NNEW must provide security policy administration

Function#	Function	CATEGORY	ADDENDUM REQ#	Addendum Requirement Text
F.4.5.2	Ensure Security Policy	Security	3.1.4.15	NNEW must enforce security policy

Appendix 5: References

Reference	Link	Comment
JPDO Weather ConOps	Line 58	File located at: http://www.jpdo.gov/library/Weather_ConOps.pdf
NextGen Weather ConOps	Line 71	
OGC Standards	Line 122	Standards located at: http://www.opengeospatial.org/
Weather Related Service Functional Layers	Line 137	Figure derived from the SV-4 diagram
FAA Standard 025, Preparation of Interface Control Documents	Line 659	File located at: http://www.faa.gov/air_traffic/nas/system_standards/standards/media/pdf/FAA-STD-025E.pdf
NAS System Requirements Specifications	Line 662	
IOC Product Flows	Line 733	Table derived from the IOC Product Flows Spreadsheet
NNEW Technical Architecture Framework	Line 764	
FGDC Content Standard for Digital Geospatial Metadata	Line 771	File located at: http://www.fgdc.gov/standards/projects/FGDC-standards-projects/metadata/base-metadata/v2_0698.pdf
Data Standard for the NAS	Line 755	File located at: http://www.faa.gov/air_traffic/nas/system_standards/standards/media/pdf/FAA-STD-060B.pdf
FAA Order 1375.1, Data Management	Line 776	File located at: http://www.faa.gov/about/office_org/headquarters_offices/aio/library/media/1375_1D_Final062606v2.pdf
Software Development for the NAS	Line 781	File located at: http://www.faa.gov/air_traffic/nas/system_standards/standards/media/pdf/FAA-STD-026A.pdf
XML Namespaces for the NAS	Line 783	File located at: http://www.faa.gov/air_traffic/nas/system_standards/standards/media/pdf/FAA-STD-063.pdf

Service Registration for the NAS	Line 784	File located at: http://www.faa.gov/air_traffic/nas/system_standards/standards/media/pdf/FAA-STD-064.pdf
Web Service Specification for the NAS	Line 786	File located at: http://www.faa.gov/air_traffic/nas/system_standards/standards/media/pdf/FAA-STD-065.pdf
Web Service Taxonomies for the NAS	Line 788	File located at: http://www.faa.gov/air_traffic/nas/system_standards/standards/media/pdf/FAA-STD-066.pdf

Appendix 6: Interface List

The tables below have been produced to document the interfaces to the NNEW System. The entries of the tables are color-coded to indicate their status as interfaces to NNEW. It assumed that interfaces to NNEW means that the NNEW System will have a direct connection to the system or entity.

Green: System or entity has already been identified and there is very little to question about the interface.
Yellow: System or entity has questions surrounding a potential interface to the NNEW System and needs to be investigated further.
Red: System or entity is not expected to have an interface to the NNEW System but are a part of the list to maintain documentation why it will not interface with the NNEW System.

The following are the list of potential internal FAA consumers that have been identified as potential consumers of the NNEW System.

System	NNEW Consumer?	Service Adaptor needed?
ATOP	Yes	Yes
Common Weather Display	Yes	No
Cyber Security Management Center	?	?
DOTS	Yes	Yes
DSR	No	No
DUATs	?	?
ERAM	Yes	Yes
FDP2K	Yes	Yes
Host	No	No
ITWS-NFU	Yes	No
ITWS-PG	Yes	Yes
MAPS	Yes	Yes
MEARTS	Yes	Yes
NIDS	Yes	Yes
NWP	Yes	No
NWP Sensors	No	No
Post-event Data Extraction System	No	No
TBFM	Yes	Yes
TFMS	Yes	Yes
Traffic Management Advisory (TMA) tool	No	Yes
URET	No	No

The following are the list of potential internal FAA providers that have been identified as potential consumers of the NNEW System.

System	NNEW Provider?	Service Adaptor Needed?
AIM	no	no
ERAM	?	?
ITWS*	Yes	Yes
Lightning		
LLWAS	no	no
MAPS	?	?
NEVS	no	no
NWP	Yes	No
RASP	Yes	Yes

The following are the list of potential interfaces to the NNEW System that exist external to FAA's operational network. These include NAS Stakeholders, external government agencies, and other commercial entities.

External Interface	Consumer (C), Provider (P), Both (B), Not Applicable (n/a)	Name of System interfacing?
Airlines	Consumer	?
Airport Operators	n/a	n/a
Automatic Lightning Detection System (ALDS) Bureau of Land Management (BLM)	No	No
Commercial Wx Providers	Consumer	?
DoD	Consumer	?
NWS	Both	4-D Wx Data Cube
Radar	No	CANRAD

Appendix 7: Product List

The following table comprises a list of NNEW System products and their quality of service characteristics.

FAA		NOAA		FAA							
FAA Systems	Product	Source System	Sink System	Source System	Sink System	NNEW Format	Update Frequency	Size - Minimum Observed (bytes)	Size - Maximum Observed (bytes)	Size - Worst Case Maximum (bytes)	Multiplier (i.e., multiple files such as multiple NEXRADs)
NWP											
	Product 2		NESG	NESG	NWP	XML	4-10 mins				155
	Product 3		NESG	NESG	NWP		4-10 mins				155
	Product 20		NESG	NESG	NWP	NetCDF4	7.31 mins	8,166	29,130	29,130	155
	Product 38		NESG	NESG	NWP	NetCDF4	7.32 min	4,596	16,508	16,508	155
	Product 41		NESG	NESG	NWP	NetCDF4	4-10 min	190	4,208	4,208	155
	Product 57		NESG	NESG	NWP	NetCDF4	7.32 min	1,348	3,250	3,250	155
	Product 65		NESG	NESG	NWP	NetCDF4	7.32 min	1,378	5,356	5,356	155
	Product 66		NESG	NESG	NWP	NetCDF4	7.33 min	1,348	4,180	4,180	155
	Product 67		NESG	NESG	NWP	NetCDF4	7.33 min	1,360	5,374	5,374	155
	Product 75		NESG	NESG	NWP	XML	4-10 min				155
	Product 90		NESG	NESG	NWP	NetCDF4	7.34 min	1,348	2,602	2,602	155
	Product 94		NESG	NESG	NWP	NetCDF4					
	Product 98		NESG	NESG	NWP	NetCDF4					155
	Product 134		NESG	NESG	NWP	NetCDF4	7.32 min	168,000	168,000	168,000	155
	Product 135		NESG	NESG	NWP	NetCDF4	4-10 min	127,000	127,000	127,000	155
	Conventional Volume (CONVOL) Unfiltered Reflectivity (ZT) Product		NESG	NESG	NWP						
	Caribbean Weather Radar		NESG	NESG	NWP						

NNEW Initial Program Requirements

FAA		NOAA		FAA							
FAA Systems	Product	Source System	Sink System	Source System	Sink System	NNEW Format	Update Frequency	Size - Minimum Observed (bytes)	Size - Maximum Observed (bytes)	Size - Worst Case Maximum (bytes)	Multiplier (i.e., multiple files such as multiple NEXRADs)
	HIPS polar orbiting satellite data (Alaska)		NESG	NESG	NWP						
	Channel 1 Visible 0.65um 1km		NESG	NESG	NWP	NetCDF-3	15 min	198,400,000	297,600,000	297,600,000	1
	Channel 2 Shortwave 3.9 um 4km		NESG	NESG	NWP	NetCDF-3	15 min	49,600,000	74,400,000	74,400,000	1
	Channel 3 Moisture 6.7 um 8km		NESG	NESG	NWP	NetCDF-3	15 min	49,600,000	74,400,000	74,400,000	1
	Channel 4 IR 10.7 um 4km		NESG	NESG	NWP	NetCDF-3	15 min	49,600,000	74,400,000	74,400,000	1
	Channel 5 IR 12.0 um 4km		NESG	NESG	NWP	NetCDF-3	15 min	49,600,000	74,400,000	74,400,000	1
	Channel 1 Visible 0.65um 1km		NESG	NESG	NWP	NetCDF-3	15 min	198,400,000	297,600,000	297,600,000	1
	Channel 2 Shortwave 3.9 um 4km		NESG	NESG	NWP	NetCDF-3	15 min	49,600,000	74,400,000	74,400,000	1
	Channel 3 Moisture 6.5 um 8km		NESG	NESG	NWP	NetCDF-3	15 min	49,600,000	74,400,000	74,400,000	1
	Channel 4 IR 10.7 um 4km		NESG	NESG	NWP	NetCDF-3	15 min	49,600,000	74,400,000	74,400,000	1
	Channel 6 IR 13.3 um 4km		NESG	NESG	NWP	NetCDF-3	15 min	49,600,000	74,400,000	74,400,000	1
	WRF-RR winds		NESG	NESG	NWP	NetCDF4	Hourly	50KB	120KB		
	WRF-RR Temps		NESG	NESG	NWP	NetCDF4	Hourly	50KB	120KB		
	15-Minute VIL		NESG	NESG	NWP	NetCDF4	Hourly	30KB	150KB		
	15-Minute Echo Tops		NESG	NESG	NWP	NetCDF4	Hourly	30KB	150KB		
	Pressure		NESG	NESG	NWP	NetCDF4	Hourly	30KB	150KB		
	One Minute Observations			RASP	NWP	XML	60	230 per Ob			about 1000
	METARs (NOAA generated)		NESG	NESG	NWP	XML	5-6 min	671,298	1,358,632	1,358,632	1
	Mesonet		NESG	NESG	NWP		5-6 min	718,898	13,214,618	13,214,618	1

NNEW Initial Program Requirements

FAA		NOAA		FAA							
FAA Systems	Product	Source System	Sink System	Source System	Sink System	NNEW Format	Update Frequency	Size - Minimum Observed (bytes)	Size - Maximum Observed (bytes)	Size - Worst Case Maximum (bytes)	Multiplier (i.e., multiple files such as multiple NEXRADs)
	Maritime		NESG	NESG	NWP		5-6 min	10,677	247,271	247,271	1
	Lightning Detection Data (FAA Contractor)			NESG	NWP	XML	5 seconds* see note	Varies	124	Varies	
	Sensor Up/Down Messages			NESG	NWP	XML					
ATOP											
	UKMet Thin Grids GRIB Messages (Temp (Kelvin) and U and V wind components)		NESG	NESG	ATOP						
	GFS Thin Grids GRIB Messages (Temp (Kelvin) and U and V wind components)		NESG	NESG	ATOP	NetCDF4					
DOTS+											
	GFS Thin Grids GRIB Messages (Temp (Kelvin) and U and V wind components)		NESG	NESG	DOTS +	NetCDF4					
ERAM											
	WRF-RR winds		NESG	NESG	ERAM	NetCDF4	Hourly	50KB	120KB		
	WRF-RR Temps		NESG	NESG	ERAM	NetCDF4	Hourly	50KB	120KB		
FDP2K											
	NAM V GRIB Messages (MSLP, U Component, V Component, Temperature (K))		NESG	NESG	FDP2K						
	METARs (FAA generated)			RASP	FDP2K	XML	Hourly or less				
	SPECIs			RASP	FDP2K	XML	Hourly or less				
	SIGMETs		NESG	NESG	FDP2K	NetCDF4	4 hours or less				
ITWS											
	Product 59		NESG	NESG	ITWS	XML	5.90 min	1,596	12,022	12,022	155
	Product 93		NESG	NESG	ITWS	NetCDF4	4-10 min				155

NNEW Initial Program Requirements

FAA		NOAA		FAA							
FAA Systems	Product	Source System	Sink System	Source System	Sink System	NNEW Format	Update Frequency	Size - Minimum Observed (bytes)	Size - Maximum Observed (bytes)	Size - Worst Case Maximum (bytes)	Multiplier (i.e., multiple files such as multiple NEXRADs)
	Product 134		NESG	NESG	ITWS	NetCDF4	7.32 min	168,000	168,000	168,000	155
	Product 135		NESG	NESG	ITWS	NetCDF4	4-10 min	127,000	127,000	127,000	155
	Product 141		NESG	NESG	ITWS	XML	5.99 min	150	3,364	3,364	155
	Product 143		NESG	NESG	ITWS	XML	5.97 min	2,142	5,112	5,112	155
	Lightning Detection Data (FAA Contractor)			NESG	ITWS	XML	5 seconds* see note	Varies	124	Varies	
	One Minute Observations			RASP	ITWS	XML	60 sec	230 per Ob			about 1000
	Aircraft Observations		NESG	NESG	ITWS	XML					
	WRF-RR		NESG	NESG	ITWS	NetCDF4					
	Puerto Rico Model		NESG	NESG	ITWS						
NIDS											
	ADA		NESG	NESG	NIDS						
	ADM		NESG	NESG	NIDS						
	ADR		NESG	NESG	NIDS						
	FTM		NESG	NESG	NIDS						
	AIR		NESG	NESG	NIDS	NetCDF4					
	ARP		NESG	NESG	NIDS						
	AWW		NESG	NESG	NIDS						
	CFP		NESG	NESG	NIDS	XML					
	CWA		NESG	NESG	NIDS						
	CWS		NESG	NESG	NIDS						
	FTA		NESG	NESG	NIDS	XML					
	MIS		NESG	NESG	NIDS						

NNEW Initial Program Requirements

FAA		NOAA		FAA							
FAA Systems	Product	Source System	Sink System	Source System	Sink System	NNEW Format	Update Frequency	Size - Minimum Observed (bytes)	Size - Maximum Observed (bytes)	Size - Worst Case Maximum (bytes)	Multiplier (i.e., multiple files such as multiple NEXRADs)
	OAV		NESG	NESG	NIDS						
	PIR		NESG	NESG	NIDS	XML					
	PRC		NESG	NESG	NIDS						
	TAF		NESG	NESG	NIDS	XML					
	TAP		NESG	NESG	NIDS						
	WA1		NESG	NESG	NIDS	NetCDF4					
	WA2		NESG	NESG	NIDS	NetCDF4					
	WA3		NESG	NESG	NIDS	NetCDF4					
	WA4		NESG	NESG	NIDS	NetCDF4					
	WA5		NESG	NESG	NIDS	NetCDF4					
	WA6		NESG	NESG	NIDS	NetCDF4					
	WA7		NESG	NESG	NIDS	NetCDF4					
	WA8		NESG	NESG	NIDS	NetCDF4					
	WA9		NESG	NESG	NIDS	NetCDF4					
	18A		NESG	NESG	NIDS						
	24A		NESG	NESG	NIDS						
	AFD		NESG	NESG	NIDS						
	AFP		NESG	NESG	NIDS						
	EFP		NESG	NESG	NIDS						
	EOL		NESG	NESG	NIDS						
	FA1		NESG	NESG	NIDS						
	FA2		NESG	NESG	NIDS						
	FA3		NESG	NESG	NIDS						
	FA4		NESG	NESG	NIDS						
	FA5		NESG	NESG	NIDS						
	FA6		NESG	NESG	NIDS						

NNEW Initial Program Requirements

FAA		NOAA		FAA							
FAA Systems	Product	Source System	Sink System	Source System	Sink System	NNEW Format	Update Frequency	Size - Minimum Observed (bytes)	Size - Maximum Observed (bytes)	Size - Worst Case Maximum (bytes)	Multiplier (i.e., multiple files such as multiple NEXRADs)
	FA7		NESG	NESG	NIDS						
	FA8		NESG	NESG	NIDS						
	FA9		NESG	NESG	NIDS						
	FD0		NESG	NESG	NIDS						
	FD1		NESG	NESG	NIDS						
	FD2		NESG	NESG	NIDS						
	FD3		NESG	NESG	NIDS						
	FOF		NESG	NESG	NIDS						
	FOH		NESG	NESG	NIDS						
	FTP		NESG	NESG	NIDS						
	FWC		NESG	NESG	NIDS						
	LFP		NESG	NESG	NIDS						
	NOW		NESG	NESG	NIDS						
	OFA		NESG	NESG	NIDS						
	OFF		NESG	NESG	NIDS						
	QPF		NESG	NESG	NIDS						
	SFD		NESG	NESG	NIDS						
	SFP		NESG	NESG	NIDS						
	SGW		NESG	NESG	NIDS						
	SMF		NESG	NESG	NIDS						
	ZFP		NESG	NESG	NIDS						
	CFW		NESG	NESG	NIDS						
	CWF		NESG	NESG	NIDS						
	GLF		NESG	NESG	NIDS						
	HSF		NESG	NESG	NIDS						
	MAW		NESG	NESG	NIDS						

NNEW Initial Program Requirements

FAA		NOAA		FAA							
FAA Systems	Product	Source System	Sink System	Source System	Sink System	NNEW Format	Update Frequency	Size - Minimum Observed (bytes)	Size - Maximum Observed (bytes)	Size - Worst Case Maximum (bytes)	Multiplier (i.e., multiple files such as multiple NEXRADs)
	MWS		NESG	NESG	NIDS						
	NSH		NESG	NESG	NIDS						
	SMW		NESG	NESG	NIDS						
	STW		NESG	NESG	NIDS						
	ABV		NESG	NESG	NIDS						
	BOY		NESG	NESG	NIDS						
	CLI		NESG	NESG	NIDS						
	FZL		NESG	NESG	NIDS						
	HYD		NESG	NESG	NIDS						
	MAN		NESG	NESG	NIDS						
	MTR		NESG	NESG	NIDS						
	SGL		NESG	NESG	NIDS						
	SHN		NESG	NESG	NIDS						
	SHP		NESG	NESG	NIDS						
	SPE		NESG	NESG	NIDS						
	SSI		NESG	NESG	NIDS						
	SSM		NESG	NESG	NIDS						
	SSO		NESG	NESG	NIDS						
	ESF		NESG	NESG	NIDS						
	FFA		NESG	NESG	NIDS						
	FFS		NESG	NESG	NIDS						
	FFW		NESG	NESG	NIDS						
	FLS		NESG	NESG	NIDS						
	FLW		NESG	NESG	NIDS						
	LSR		NESG	NESG	NIDS						
	NPW		NESG	NESG	NIDS						

NNEW Initial Program Requirements

FAA		NOAA		FAA							
FAA Systems	Product	Source System	Sink System	Source System	Sink System	NNEW Format	Update Frequency	Size - Minimum Observed (bytes)	Size - Maximum Observed (bytes)	Size - Worst Case Maximum (bytes)	Multiplier (i.e., multiple files such as multiple NEXRADs)
	SAW		NESG	NESG	NIDS						
	SEL		NESG	NESG	NIDS						
	SIG		NESG	NESG	NIDS	NetCDF4					
	SPS		NESG	NESG	NIDS						
	STA		NESG	NESG	NIDS						
	SVR		NESG	NESG	NIDS						
	SVS		NESG	NESG	NIDS						
	TOR		NESG	NESG	NIDS						
	WS5		NESG	NESG	NIDS	NetCDF4					
	WS6		NESG	NESG	NIDS	NetCDF4					
	WSW		NESG	NESG	NIDS						
	WWA		NESG	NESG	NIDS						
	CHG		NESG	NESG	NIDS						
	TCD		NESG	NESG	NIDS						
	TCE		NESG	NESG	NIDS						
	TCM		NESG	NESG	NIDS						
	TWD		NESG	NESG	NIDS						
	TWO		NESG	NESG	NIDS						
	FWF		NESG	NESG	NIDS						
	HRR		NESG	NESG	NIDS						
	NWX		NESG	NESG	NIDS						
	PMD		NESG	NESG	NIDS						
	PNS		NESG	NESG	NIDS						
	RWS		NESG	NESG	NIDS						
	SCS		NESG	NESG	NIDS						
	SYN		NESG	NESG	NIDS						

NNEW Initial Program Requirements

FAA		NOAA		FAA							
FAA Systems	Product	Source System	Sink System	Source System	Sink System	NNEW Format	Update Frequency	Size - Minimum Observed (bytes)	Size - Maximum Observed (bytes)	Size - Worst Case Maximum (bytes)	Multiplier (i.e., multiple files such as multiple NEXRADs)
	TAV		NESG	NESG	NIDS						
	VAA		NESG	NESG	NIDS						
	NMCGPH92E		NESG	NESG	NIDS						
	NMCGPHL2P		NESG	NESG	NIDS						
	NMCGPH93E		NESG	NESG	NIDS						
	NMCGPH94Q		NESG	NESG	NIDS						
	NMCGPHL4P		NESG	NESG	NIDS						
	NMCGPHL6P		NESG	NESG	NIDS						
	NMCGPHL8P		NESG	NESG	NIDS						
	NMCGPHP0P		NESG	NESG	NIDS						
	NMCGPHP0S		NESG	NESG	NIDS						
	NMCGPHI0P		NESG	NESG	NIDS						
	NMCGPHL2W		NESG	NESG	NIDS						
	NMCGPHL4W		NESG	NESG	NIDS						
	NMCGPHP0W		NESG	NESG	NIDS						
	NMCGPH90W		NESG	NESG	NIDS						
	NMCGPH94O		NESG	NESG	NIDS						
	NMCGPH98O		NESG	NESG	NIDS						
	NMCGPH7WG		NESG	NESG	NIDS						
	NMCGPH7XG		NESG	NESG	NIDS						
	NMCGPH7YG		NESG	NESG	NIDS						
	NMCGPH90I		NESG	NESG	NIDS						
	NMCGPH9JH		NESG	NESG	NIDS						
	NMCGPH92F		NESG	NESG	NIDS						
	NMCGPH94F		NESG	NESG	NIDS						

NNEW Initial Program Requirements

FAA		NOAA		FAA							
FAA Systems	Product	Source System	Sink System	Source System	Sink System	NNEW Format	Update Frequency	Size - Minimum Observed (bytes)	Size - Maximum Observed (bytes)	Size - Worst Case Maximum (bytes)	Multiplier (i.e., multiple files such as multiple NEXRADs)
	NMCGPH96F		NESG	NESG	NIDS						
	NMCGPH98F		NESG	NESG	NIDS						
	NMCGPHL2F		NESG	NESG	NIDS						
	NMCGPHL4F		NESG	NESG	NIDS						
	NMCGPHP0X		NESG	NESG	NIDS						
	NMCGPHP0N		NESG	NESG	NIDS						
	NMCGPH90X		NESG	NESG	NIDS						
	NMCGPH90N		NESG	NESG	NIDS						
	NMCGPH90F		NESG	NESG	NIDS						
	NMCGPH9AM		NESG	NESG	NIDS						
	NMCGPH9AV		NESG	NESG	NIDS						
	NMCGPH93P		NESG	NESG	NIDS						
	GOES_E_PSN_IR1[1,2]			NWP	NIDS						
	GOES_E_PSN_IR2[1,2]			NWP	NIDS						
	GOES_E_PSN_IR4[1,2]			NWP	NIDS						
	GOES_E_PSN_VIS[1,2]			NWP	NIDS						
	GOES_E_PSN_WV[1,2]			NWP	NIDS						
	GOES_W_PSN_IR1[1,2]			NWP	NIDS						
	GOES_W_PSN_IR2[1]			NWP	NIDS						
	GOES_W_PSN_IR4[1]			NWP	NIDS						
	GOES_W_PSN_VIS[1]			NWP	NIDS						
	GOES_W_PSN_WV[1]			NWP	NIDS						
	LIGHTNING			NWP	NIDS						
	APR (67)		NESG	NESG	NIDS	NetCDF4	7.33 min	1,360	5,374	5,374	155

NNEW Initial Program Requirements

FAA		NOAA		FAA							
FAA Systems	Product	Source System	Sink System	Source System	Sink System	NNEW Format	Update Frequency	Size - Minimum Observed (bytes)	Size - Maximum Observed (bytes)	Size - Worst Case Maximum (bytes)	Multiplier (i.e., multiple files such as multiple NEXRADs)
	CR4L6 (38)		NESG	NESG	NIDS	NetCDF4	7.32 min	4,596	16,508	16,508	155
	CR4L6AP (98)		NESG	NESG	NIDS	NetCDF4					155
	CR4L8 (36)		NESG	NESG	NIDS	NetCDF4	4-10 min	4,436	11,396	11,396	155
	DVL (134)		NESG	NESG	NIDS	NetCDF4	7.32 min	168,000	168,000	168,000	155
	EET (135)		NESG	NESG	NIDS	NetCDF4	4-10 min	127,000	127,000	127,000	155
	ET (41)		NESG	NESG	NIDS	NetCDF4	4-10 min	190	4,208	4,208	155
	HI (59)		NESG	NESG	NIDS	XML	5.90 min	1,596	12,022	12,022	155
	LRMH (66)		NESG	NESG	NIDS	NetCDF4	7.33 min	1,348	4,180	4,180	155
	LRML (65)		NESG	NESG	NIDS	NetCDF4	7.32 min	1,378	5,356	5,356	155
	LRMS (90)		NESG	NESG	NIDS	NetCDF4	7.34 min	1,348	2,602	2,602	155
	R1L6T1 (20)		NESG	NESG	NIDS	NetCDF4	7.31 min	8,166	29,130	29,130	155
	R1M6T1 (19)		NESG	NESG	NIDS	NetCDF4	7.32 min	8,166	39,152	39,152	155
	SS (62)		NESG	NESG	NIDS	XML	5.91 min	3,604	20,830	20,830	155
	STI (58)		NESG	NESG	NIDS	XML	6.22 min	1,392	21,894	21,894	155
	SWP (47)		NESG	NESG	NIDS	XML	4-10 min	166	306	306	155
	TVS (61)		NESG	NESG	NIDS	XML	5.97 min	2,142	5,112	5,112	155
	MOS_BAS2			NWP	NIDS	NetCDF4					
	MOS_BAS4			NWP	NIDS	NetCDF4					
	MOS_BROP2			NWP	NIDS	NetCDF4					
	MOS_BROP4			NWP	NIDS	NetCDF4					
	MOS_CR			NWP	NIDS	NetCDF4					
	MOS_CROP			NWP	NIDS	NetCDF4					
	MOS_DVL2			NWP	NIDS	NetCDF4					
	MOS_DVL4			NWP	NIDS	NetCDF4					
	MOS_EET2			NWP	NIDS	NetCDF4					

NNEW Initial Program Requirements

FAA		NOAA		FAA							
FAA Systems	Product	Source System	Sink System	Source System	Sink System	NNEW Format	Update Frequency	Size - Minimum Observed (bytes)	Size - Maximum Observed (bytes)	Size - Worst Case Maximum (bytes)	Multiplier (i.e., multiple files such as multiple NEXRADs)
	MOS_EET4			NWP	NIDS	NetCDF4					
	MOS_ET			NWP	NIDS	NetCDF4					
	MOS_CRLO			NWP	NIDS	NetCDF4					
	MOS_CRHI			NWP	NIDS	NetCDF4					
	MOS_LRMS			NWP	NIDS	NetCDF4					
	NAT2KBR			NWP	NIDS	NetCDF4					
	NAT_BAS			NWP	NIDS	NetCDF4					
	NAT4KCR			NWP	NIDS	NetCDF4					
	NAT_CR			NWP	NIDS	NetCDF4					
	NAT4KET			NWP	NIDS	NetCDF4					
	NAT8KET			NWP	NIDS	NetCDF4					
	NAT2KDVL			NWP	NIDS	NetCDF4					
	NAT8KDVL			NWP	NIDS	NetCDF4					
	NAT2KEET			NWP	NIDS	NetCDF4					
	NAT8KEET			NWP	NIDS	NetCDF4					
	IR1		NESG	NESG	NIDS	NetCDF-3	15 min	49,600,000	74,400,000	74,400,000	1
	IR2		NESG	NESG	NIDS	NetCDF-3	15 min	49,600,000	74,400,000	74,400,000	1
	IR3		NESG	NESG	NIDS	NetCDF-3	15 min	49,600,000	74,400,000	74,400,000	1
	IR4		NESG	NESG	NIDS	NetCDF-3	15 min	49,600,000	74,400,000	74,400,000	1
	VIS		NESG	NESG	NIDS	NetCDF-3	15 min	198,400,000	297,600,000	297,600,000	1
	WV		NESG	NESG	NIDS	NetCDF-3	15 min	49,600,000	74,400,000	74,400,000	1
	IR1		NESG	NESG	NIDS	NetCDF-3	15 min	49,600,000	74,400,000	74,400,000	1
	IR2		NESG	NESG	NIDS	NetCDF-3	15 min	49,600,000	74,400,000	74,400,000	1
	IR3		NESG	NESG	NIDS	NetCDF-3	15 min	49,600,000	74,400,000	74,400,000	1

NNEW Initial Program Requirements

FAA		NOAA		FAA							
FAA Systems	Product	Source System	Sink System	Source System	Sink System	NNEW Format	Update Frequency	Size - Minimum Observed (bytes)	Size - Maximum Observed (bytes)	Size - Worst Case Maximum (bytes)	Multiplier (i.e., multiple files such as multiple NEXRADs)
	IR4		NESG	NESG	NIDS	NetCDF-3	15 min	49,600,000	74,400,000	74,400,000	1
	VIS		NESG	NESG	NIDS	NetCDF-3	15 min	198,400,000	297,600,000	297,600,000	1
	WV		NESG	NESG	NIDS	NetCDF-3	15 min	49,600,000	74,400,000	74,400,000	1
	1J1F		NESG	NESG	NIDS						
	1AF		NESG	NESG	NIDS						
	1F2F		NESG	NESG	NIDS						
	1ABF		NESG	NESG	NIDS						
	1AKF		NESG	NESG	NIDS						
	1F1F		NESG	NESG	NIDS						
	1ACF		NESG	NESG	NIDS						
	1KKF		NESG	NESG	NIDS						
	4J1F		NESG	NESG	NIDS						
	4AF		NESG	NESG	NIDS						
	4F2F		NESG	NESG	NIDS						
	4ABF		NESG	NESG	NIDS						
	4AKF		NESG	NESG	NIDS						
	4A1		NESG	NESG	NIDS						
	4A2		NESG	NESG	NIDS						
	4F1F		NESG	NESG	NIDS						
	4ACF		NESG	NESG	NIDS						
	4KKF		NESG	NESG	NIDS						
	4GVF		NESG	NESG	NIDS						
	4AV1F		NESG	NESG	NIDS						
	4AV2F		NESG	NESG	NIDS						
BT Replace											

NNEW Initial Program Requirements

FAA		NOAA		FAA							
FAA Systems	Product	Source System	Sink System	Source System	Sink System	NNEW Format	Update Frequency	Size - Minimum Observed (bytes)	Size - Maximum Observed (bytes)	Size - Worst Case Maximum (bytes)	Multiplier (i.e., multiple files such as multiple NEXRADs)
ment											
	**The BT Replacement data flows are identical to the NIDS data flows shown above. The only change from the data listed above is that the FAA sink system (column I) will be the BT Replacement										
NESG											
	VIL Mosaic (Current/Minute 0)			NWP	NESG	NetCDF4	150 sec	537,296	2,466,687	13,253,410,584	
	VIL Mosaic Data Quality Flags (Current/Minute 0)			NWP	NESG	NetCDF4					
	VIL Phase Forecast (Minute 0)			NWP	NESG	NetCDF4					
	VIL (Current/Minute 0), quantized			NWP	NESG	NetCDF4					
	VIL Forecast (0-2 hours)			NWP	NESG	NetCDF4	300 sec	1,849,364	31,041,632	574,072,767,220	
	VIL Phase Forecast (0-2 hours)			NWP	NESG	NetCDF4					
	VIL Mosaic Data Quality Flags (0-2 hours)			NWP	NESG	NetCDF4					
	VIL Forecast (0-2 hours), quantized			NWP	NESG	NetCDF4					
	Echo Tops Mosaic (Current/Minute 0)			NWP	NESG	NetCDF4	150 sec	221,281	733,984	1,624,167,135	
	Echo Tops Mosaic Data Quality Flags (Current/Minute 0)			NWP	NESG	NetCDF4					
	Echo Tops (Current/Minute 0), quantized			NWP	NESG	NetCDF4					
	Echo Tops Forecast (0-2 hours)			NWP	NESG	NetCDF4	300 sec	558,185	7,676,298	42,847,943,991	
	Echo Tops Forecast (0-2 hours), quantized			NWP	NESG	NetCDF4					
	GOES Satellite Mosaic (0-2 hours)			NWP	NESG		900 sec	2,502,555	6,546,790	163,837,020,485	
	Storm Info : Echo Top Tags (0-2 hours)			NWP	NESG	XML	150 sec	571	6,399	36,538	
	Storm Info : Leading Edges (0-2			NWP	NESG	XML	150 sec	671	37,519		

NNEW Initial Program Requirements

FAA		NOAA		FAA							
FAA Systems	Product	Source System	Sink System	Source System	Sink System	NNEW Format	Update Frequency	Size - Minimum Observed (bytes)	Size - Maximum Observed (bytes)	Size - Worst Case Maximum (bytes)	Multiplier (i.e., multiple files such as multiple NEXRADs)
	hours)									251,752	
	Storm Info : Motion Vectors (0-2 hours)			NWP	NESG	XML	150 sec	568	3,562	20,232	
	VIL Contours (Standard Mode) (0-2 hours)			NWP	NESG	XML	300 sec	620	69,309	429,716	
	VIL Contours (Winter Mode) (0-2 hours)			NWP	NESG	XML	300 sec	2,290	458,569	10,501,230	
	Echo Tops Contours (0-2 hours)			NWP	NESG	XML	300 sec	625	51,246	320,288	
	Growth Contours (0-2 hours)			NWP	NESG	XML	150 sec	574	28,853	165,616	
	Decay Contours (0-2 hours)			NWP	NESG	XML					
	Forecast Accuracy : Echo Tops (0-2 hours)			NWP	NESG	XML	300 sec	2,209	2,306	50,940	
	Forecast Accuracy : Standard Precip (0-2 hours)			NWP	NESG	XML	300 sec	2,219	2,422	53,744	
	Forecast Accuracy : Winter Precip (0-2 hours)			NWP	NESG	XML	300 sec	2,209	2,563	56,617	
	Lightning			NWP	NESG	XML	60 sec	573	13,181	75,527	
	Storm VIL Forecast (2-8 hours)			NWP	NESG	XML	300 sec	3,999,291	33,569,711	1,342,550,430,749	
	VIL Mosaic Data Quality Flags (2-8 hours)			NWP	NESG	NetCDF4					
	VIL Phase Forecast (2-8 hours)			NWP	NESG	NetCDF4					
	Echo Tops Forecast (2-8 hours)			NWP	NESG	NetCDF4	300 sec	477,684	12,210,392	30,525,980	
	WAF Forecast (2-8 hours)			NWP	NESG		300 sec	n/a	10,000,000	25,000,000	
	Uncertainty Estimates (2-8 hours)			NWP	NESG		300 sec	n/a	10,000,000	25,000,000	
	Probabilistic Forecast (2-8 hours)			NWP	NESG		300 sec	n/a	10,000,000	25,000,000	
	Precipitation VIL Contours (Standard Mode) (2-8 hours)			NWP	NESG	XML	300 sec	n/a	530,000	1,325,000	
	VIL Contours (Winter Mode) (2-			NWP	NESG	XML	300 sec	n/a	1,500,000	3,750,000	

NNEW Initial Program Requirements

FAA		NOAA		FAA							
FAA Systems	Product	Source System	Sink System	Source System	Sink System	NNEW Format	Update Frequency	Size - Minimum Observed (bytes)	Size - Maximum Observed (bytes)	Size - Worst Case Maximum (bytes)	Multiplier (i.e., multiple files such as multiple NEXRADs)
	8 hours)										
	Echo Tops Contours (2-8 hours)			NWP	NESG	XML	300 sec	n/a	750,000	1,875,000	
	Forecast Accuracy : Echo Tops (2-8 hours)			NWP	NESG	XML	300 sec	n/a	2,100	5,250	
	Forecast Accuracy : Standard Precip (2-8 hours)			NWP	NESG	XML	300 sec	n/a	2,100	5,250	
	Forecast Accuracy : Winter Precip (2-8 hours)			NWP	NESG	XML	300 sec	n/a	2,200	5,250	
	Microburst TRACON Map			ITWS	NESG	NetCDF4	60 sec	656	1,196		
	Gust Front TRACON Map			ITWS	NESG	NetCDF4	60 sec	705	3,705		
	Gust Front ETI			ITWS	NESG	NetCDF4	60 sec	578	583		
	Terminal Winds Profile			ITWS	NESG	NetCDF4	300 sec	1,148	1,486		
	Tornado Detections			ITWS	NESG	NetCDF4	300 sec	542	860		
	Tornado Alert			ITWS	NESG	NetCDF4	300 sec	636	646		
	Configured Alerts			ITWS	NESG	NetCDF4	10 sec	867	1,280		
	Microburst ATIS			ITWS	NESG	NetCDF4	60 sec	600	631		
	Wind Shear ATIS			ITWS	NESG	NetCDF4	60 sec	599	629		
	Terminal Weather Text			ITWS	NESG	NetCDF4	60 sec	681	805		
	Airport Lightning Warning			ITWS	NESG	NetCDF4	60 sec	787	818		
	AP Status			ITWS	NESG	NetCDF4	30 sec	678	849		
	AP Indicated Precipitation			ITWS	NESG	XML	28 sec	3,664	6,953		
	Precipitation 5nm			ITWS	NESG	XML	120 sec	3,016	4,477		
	Precipitation TRACON			ITWS	NESG	XML	28 sec	8,538	10,369		
	Long-Range VIL			ITWS	NESG	NetCDF4	150 sec	24,387	26,317		
	SM_SEP 5nm			ITWS	NESG	NetCDF4	60 sec	789	2,776		
	SM_SEP TRACON			ITWS	NESG	NetCDF4	30 sec	680	4,652		
	SM_SEP LR			ITWS	NESG	NetCDF4	150 sec	685	11,014		

NNEW Initial Program Requirements

FAA		NOAA		FAA							
FAA Systems	Product	Source System	Sink System	Source System	Sink System	NNEW Format	Update Frequency	Size - Minimum Observed (bytes)	Size - Maximum Observed (bytes)	Size - Worst Case Maximum (bytes)	Multiplier (i.e., multiple files such as multiple NEXRADs)
	Hazard Text 5nm			ITWS	NESG	NetCDF4	60 sec	545	865		
	Hazard Text TRACON			ITWS	NESG	NetCDF4	30 sec	552	1,131		
	Hazard Text LR			ITWS	NESG	NetCDF4	150 sec	557	1,937		
	VIL Forecasts			ITWS	NESG	NetCDF4	300 sec	150,336	167,867		
	Forecast Accuracy			ITWS	NESG	NetCDF4	300 sec	828	859		
	VIL Forecast Contours			ITWS	NESG	NetCDF4	300 sec	607	18,262		
	Runway Configuration			ITWS	NESG		Async	2576	2576		
	One Minute Observations			RASP	NESG	XML	60 sec	230 per Ob			about 1000
	Lightning Coupled METARs (FAA generated)			RASP	NESG	XML					
TFMS											
	VIL Mosaic (Current/Minute 0)			NWP	TFMS	NetCDF4	150 sec	537,296	2,466,687	13,253,410,584	
	VIL Mosaic Data Quality Flags (Current/Minute 0)			NWP	TFMS	NetCDF4					
	VIL Phase Forecast (Minute 0)			NWP	TFMS	NetCDF4					
	VIL (Current/Minute 0), quantized			NWP	TFMS	NetCDF4					
	VIL Forecast (0-2 hours)			NWP	TFMS	NetCDF4	300 sec	1,849,364	31,041,632	574,072,767,220	
	VIL Phase Forecast (0-2 hours)			NWP	TFMS	NetCDF4					
	VIL Mosaic Data Quality Flags (0-2 hours)			NWP	TFMS	NetCDF4					
	VIL Forecast (0-2 hours), quantized			NWP	TFMS	NetCDF4					
	Echo Tops Mosaic (Current/Minute 0)			NWP	TFMS	NetCDF4	150 sec	221,281	733,984	1,624,167,135	
	Echo Tops Mosaic Data Quality Flags (Current/Minute 0)			NWP	TFMS	NetCDF4					
	Echo Tops (Current/Minute 0), quantized			NWP	TFMS	NetCDF4					

NNEW Initial Program Requirements

FAA		NOAA		FAA							
FAA Systems	Product	Source System	Sink System	Source System	Sink System	NNEW Format	Update Frequency	Size - Minimum Observed (bytes)	Size - Maximum Observed (bytes)	Size - Worst Case Maximum (bytes)	Multiplier (i.e., multiple files such as multiple NEXRADs)
	Echo Tops Forecast (0-2 hours)			NWP	TFMS	NetCDF4	300 sec	558,185	7,676,298	42,847,943,991	
	Echo Tops Forecast (0-2 hours), quantized			NWP	TFMS	NetCDF4					
	GOES Satellite Mosaic (0-2 hours)			NWP	TFMS		900 sec	2,502,555	6,546,790	163,837,020,485	
	Storm Info : Echo Top Tags (0-2 hours)			NWP	TFMS	XML	150 sec	571	6,399	36,538	
	Storm Info : Leading Edges (0-2 hours)			NWP	TFMS	XML	150 sec	671	37,519	251,752	
	Storm Info : Motion Vectors (0-2 hours)			NWP	TFMS	XML	150 sec	568	3,562	20,232	
	VIL Contours (Standard Mode) (0-2 hours)			NWP	TFMS	XML	300 sec	620	69,309	429,716	
	VIL Contours (Winter Mode) (0-2 hours)			NWP	TFMS	XML	300 sec	2,290	458,569	10,501,230	
	Echo Tops Contours (0-2 hours)			NWP	TFMS	XML	300 sec	625	51,246	320,288	
	Growth Contours (0-2 hours)			NWP	TFMS	XML	150 sec	574	28,853	165,616	
	Decay Contours (0-2 hours)			NWP	TFMS	XML					
	Forecast Accuracy : Echo Tops (0-2 hours)			NWP	TFMS	XML	300 sec	2,209	2,306	50,940	
	Forecast Accuracy : Standard Precip (0-2 hours)			NWP	TFMS	XML	300 sec	2,219	2,422	53,744	
	Forecast Accuracy : Winter Precip (0-2 hours)			NWP	TFMS	XML	300 sec	2,209	2,563	56,617	
	Lightning			NWP	TFMS	XML	60 sec	573	13,181	75,527	
	Storm VIL Forecast (2-8 hours)			NWP	TFMS	XML	300 sec	3,999,291	33,569,711	1,342,550,430,749	
	VIL Mosaic Data Quality Flags (2-8 hours)			NWP	TFMS	NetCDF4					
	VIL Phase Forecast (2-8 hours)			NWP	TFMS	NetCDF4					
	Echo Tops Forecast (2-8 hours)			NWP	TFMS	NetCDF4	300 sec	477,684	12,210,392	30,525,980	

NNEW Initial Program Requirements

FAA		NOAA		FAA							
FAA Systems	Product	Source System	Sink System	Source System	Sink System	NNEW Format	Update Frequency	Size - Minimum Observed (bytes)	Size - Maximum Observed (bytes)	Size - Worst Case Maximum (bytes)	Multiplier (i.e., multiple files such as multiple NEXRADs)
	WAF Forecast (2-8 hours)			NWP	TFMS		300 sec	n/a	10,000,000	25,000,000	
	Uncertainty Estimates (2-8 hours)			NWP	TFMS		300 sec	n/a	10,000,000	25,000,000	
	Probabilistic Forecast (2-8 hours)			NWP	TFMS		300 sec	n/a	10,000,000	25,000,000	
	Precipitation VIL Contours (Standard Mode) (2-8 hours)			NWP	TFMS	XML	300 sec	n/a	530,000	1,325,000	
	VIL Contours (Winter Mode) (2-8 hours)			NWP	TFMS	XML	300 sec	n/a	1,500,000	3,750,000	
	Echo Tops Contours (2-8 hours)			NWP	TFMS	XML	300 sec	n/a	750,000	1,875,000	
	Forecast Accuracy : Echo Tops (2-8 hours)			NWP	TFMS	XML	300 sec	n/a	2,100	5,250	
	Forecast Accuracy : Standard Precip (2-8 hours)			NWP	TFMS	XML	300 sec	n/a	2,100	5,250	
	Forecast Accuracy : Winter Precip (2-8 hours)			NWP	TFMS	XML	300 sec	n/a	2,200	5,250	